THE IRON AGE

DECEMBER 17, 1936

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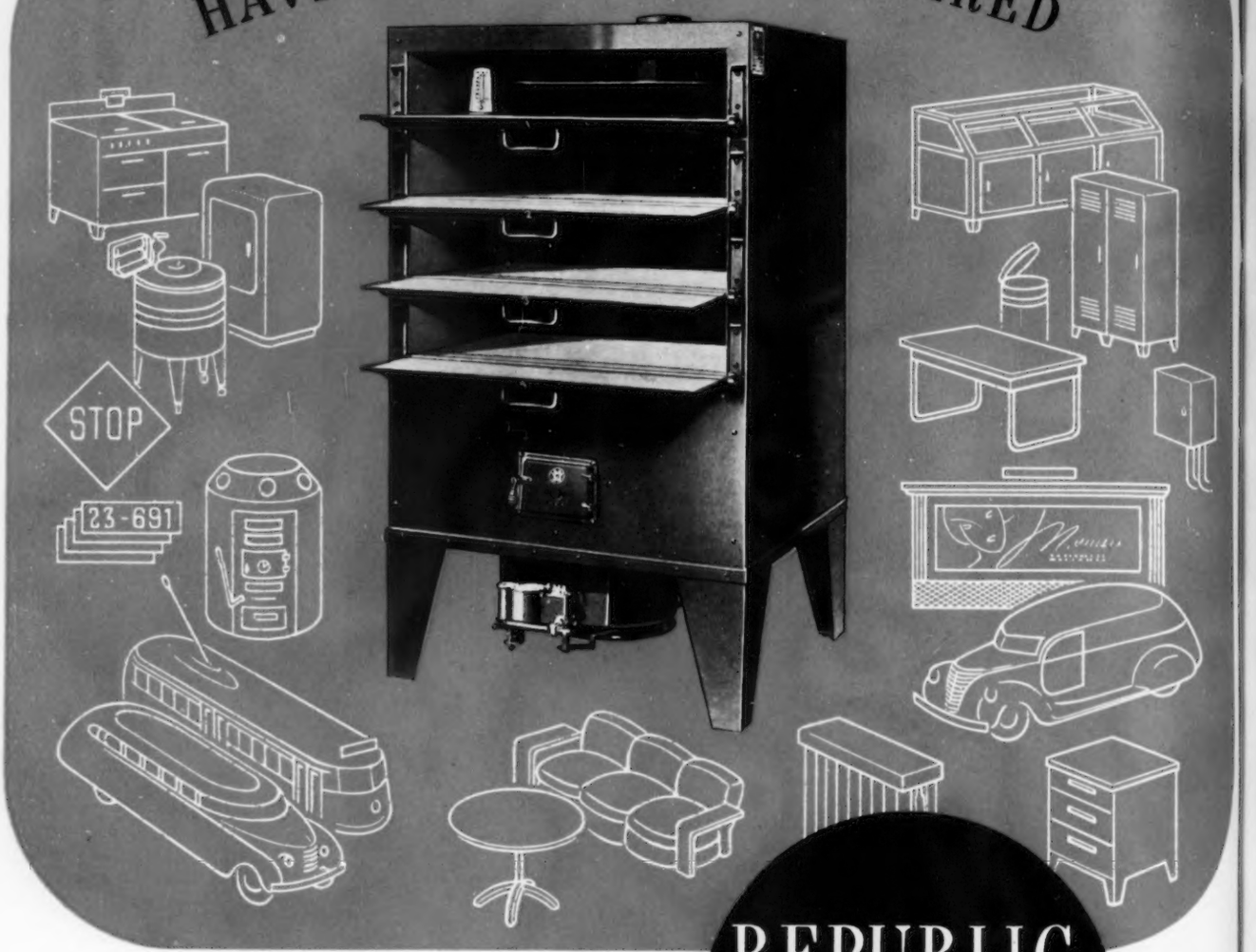

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...THE IRON AGE...

DECEMBER 17, 1936

ESTABLISHED 1855 Vol. 138, No. 25

Observe the Oyster!

THROUGHOUT the troubled ages, people faced with perplexing problems have been advised to take council with Nature.

Thus the admonition by the great Teacher to those of his hearers who were worrying too much about material things: "Consider the lilies of the field. They toil not, neither do they spin, yet Solomon in all his glory was not arrayed like one of these."

Surely the interpretation of this is not, as some "modernists" believe, that people should stop toiling and spinning, join nudist colonies and become grass eaters or depend for food and clothing upon "handouts" from higher quarters. Rather, the thought is that we should do the best we can from day to day and then stop worrying about what may happen tomorrow.

Then, too, there was the injunction of Solomon to the lazy man. He said: "Go to the ant, thou sluggard; consider her ways and be wise." Very good advice, this, to sluggards, for ants in spite of being so completely organized do not insist upon a six-hour day.

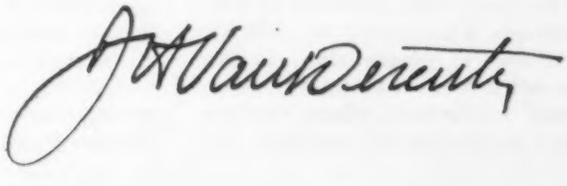
What comfort can we find in Nature for the perplexed shop executive, be he big boss or straw boss who is harassed and hampered by the irritation of labor troubles and whose sleep is disturbed by visions of sit-down strikes, stand-up strikes, walkouts, picket lines and other unpleasant happenings?

To such men, Solomon might have said, "Observe the oyster! No complacent, peaceful and untroubled oyster ever produced a pearl."

It requires the stimulus of irritation to induce an oyster to make a pearl. A grain of sand or a piece of shell or some other foreign substance gets into his "works," whereupon he proceeds to coat it, in self-defense, with those iridescent and diaphanous concentric layers of shell which form a pearl.

Let us hope that the present-day irritations which industry is experiencing will eventually result in producing pearls of wisdom of great price. Certainly there are enough foreign substances getting into the works.

There is another thought about oysters that may be of value to management. It is this: No oyster ever produced a pearl by keeping his mouth shut at a time when he should have opened it.



RANDOM THOUGHTS of an IDLE STEEL MAN

By FRANK H. CROCKARD

STEEL making and the steel industry are now passing through a most important phase of development. Because of the form or manner of this evolution, the significance of the trend is not usually appreciated at first glance.

The period 1890 to 1929 was characterized by a development of production units of large capacity, coupled with many mechanical devices designed to reduce labor requirements or to offer relief from drudgery. In the earlier stages this policy resulted in displacing labor, both skilled and unskilled.

Obviously such a system causes shifts and readjustments in employment. In the latter phase, because of labor saving machines rather than labor displacing machines, the tendency is the reverse of the first phase, inasmuch as new positions are created in entirely new lines of productivity. In the operation of such machinery labor found employment where employment previously did not exist, at the same time services were performed that otherwise could not have been accomplished.

It is difficult to conceive of any change of this development in the steel or any other industry since it has been a vitally important factor contributing to the expansion of industry, the creation of new forms of goods and services, attended with decreasing costs which are later reflected in decreased prices to consumer interests. A properly functioning industry must be an intelligently dynamic aggregate. The blind or lame cannot expect to remain in the line if through their participation the only effect is that of dragging down the general industrial level by the operation of obsolete machines or the retention of outmoded policies involving substandard wage levels and the attendant decreased purchasing power. History is not gorged with recitals of the brilliant accomplishments of armies organized on such a disingenuous basis. Speed or progress of those upon the clear highway of industrial mass or tonnage production, when directed by those familiar with a controllable machine need not be characterized as "reckless driving." By and through more equitable adjustment of these controls, speed is not optional but mandatory.

Having through mechanization sampled and enjoyed the benefits of time savings, with a relative extension of useful life, with the elimination of drudgery or its amelioration and, by the same token, increased money savings, with a truly ample life, the urge for a greater mechanization is now irresistible. A return or any recession to less effective methods of former periods is unthinkable; sporadic resistance may retard, but cannot prevent the irrepressible forces of progress. Indeed, greater emphasis is essential if reasonable prices are to obtain, in view of the trend toward higher wages, shorter hours, and social provisions imposing additional tax charges ac-

EDUCATED at Lehigh University and Michigan College of Mines, Mr. Crockard found first employment with the National Tube Co. at Wheeling, W. Va. After serving five years as superintendent of blast furnaces, he was appointed manager of the Riverside Department. Upon the acquisition of the Tennessee Coal, Iron & Railroad Co. by the Moore Schley Syndicate, he was elected vice-president and general manager of that company with headquarters at Birmingham.

During his administration the Ensley plant was rebuilt, including blast furnaces, open hearth, and blooming and rail mill departments. A number of patented features were developed by him which contributed greatly to increased production or decreased cost. The Ensley furnaces equipped with Crockard mechanical tops for the first time in southern iron history produced over 1,000,000 tons with their linings, while the fuel consumption was greatly reduced. The installation of a new duplex plant greatly decreased previous metallurgical losses occurring in the former plant, while the time required for open-hearth heats was cut in half. His experiments in converting open-hearth mill scrap into bessemer iron for recarburizing purposes was an important metallurgical contribution in the production of southern open-hearth rails.

Mr. Crockard organized a department of social science, an activity accomplishing important results relating to better housing, sanitation, and the general health and recreation provisions throughout the company communities. The well known Tennessee Coal, Iron & Railroad Co. hospital, through its excellent equipment and technical staff, provided a most unusual medical and surgical service. The accomplishments of this department received most favorable comment by sociologists.

Later, after serving a short engagement as president of the Nova Scotia Iron & Steel Co., he returned to Alabama as president of the Woodward Iron Co., whose extensive holdings of high quality raw materials in the district rank in magnitude next to those of the United States Steel Corp. During his administration the work of rebuilding or remodeling included coal and ore mines, blast furnaces and the by-product plant. As a result of decreased fuel consumption following blast furnace remodeling, 100 beehive ovens which supplemented the by-product coke plant were permanently retired from service. The development of a mechanical system of ore mining enabled the company to reduce its active Red Mountain ore operations from four to two mines, both of which are located on company rails.

FRANK H. CROCKARD

companying the present methods of social readjustment.

Laying aside any consideration of the great progress made in power development as represented by boilers, turbines, generators, motors, their accessories, etc., one is impressed by the important changes occurring in the manufacturing methods. For example, the tube and pipe industry during the life of the present generation has swung through three distinct methods of manufacture. For years lap and butt held sway, followed by the seamless method and more recently the electric welding process, each requiring plant changes of a most radical character, while the several methods called for very different skills on the part of the mill operators. The electric furnace has virtually displaced the crucible, while the continuous mills represent the most revolutionary and dramatic transition from hand methods to that of the machine in the rolling mill practice of a century.

As a result of decreased costs, improved quality and surface finish this increased tonnage will carry sheet production to incredible heights through American ingenuity offering or responding to the demands occasioned by greater uses in the steel house, air conditioning equipment, additional trucks, automobiles, streamlined trains, household and office equipment and many other uses now in laboratory development. The staggering charges of obsolescence, replacement and commercial development incident to this rapid transition need not be elaborated.

Rail Preeminence Unlikely

The prospects of continuing heavy production in the rail mill group is not especially encouraging. These mills with their very large investments and their heavy production formerly constituted a very important item in a list of total rolled products. Without a substantial increase in exports or in requirements based upon extensive national replacements calling for heavier sections, it seems improbable that rails will again regain their importance of former years. The substitution of the bus for the street car will also unfavorably affect the production of the special type of rails used in this service. Obviously railroad extensions in the United States have virtually ceased; thus future rail orders will be made up of replacement requirements almost exclusively. The higher quality rails now available as a result of increased ingot discard, heavier sections, modified chemistry including alloy additions and recently developed heat treating procedures, all are factors contributing to a longer service period. As a result of these improvements the old failure "transverse fissure" is now threatened with extinction.

Expanding this general observation, it may be noted that consumer demands call for more highly finished products. Finishing tolerances are more restricted, requir-

Distribution of Production of Finished Steel
(Expressed in Percentage of Total Domestic Steel Production)

Year 1922-1926	Rails	Shapes	Plates	Pipe	Strip	Wire	Tin Plate	Bars	Sheets	All Other
5-yr. av. ...	9.0	11.0	12.0	10.5	2.5	9.0	5.0	17.5	13.0	10.5
1929.....	6.5	17.0	12.5	11.5	8.0	7.5	4.0	18.0	14.0	6.0
1930.....	6.5	12.0	12.5	13.0	12.5	8.0	6.0	17.0	12.5	5.5
1931.....	6.0	11.0	10.5	11.5	9.0	9.5	7.5	16.0	14.0	5.0
1932.....	4.0	9.0	8.0	9.5	12.0	11.5	9.5	16.0	15.5	5.0
1933.....	2.5	6.5	7.0	9.5	11.5	12.0	12.0	16.0	18.5	4.5
1934.....	5.5	8.0	7.5	10.0	12.0	9.0	9.0	17.0	17.0	5.0
1935.....	3.0	6.5	7.0	8.0	14.0	10.0	8.5	18.5	21.0	3.5

Particularly noticeable is the very marked decrease in the proportion of rails and heavy shapes manufactured and the rather remarkable increase shown by lighter products such as sheets, tin plate and strip. This transformation has occurred in less than a decade, thus very strikingly illustrating the very rapid swing in market demands. This shift has required very costly and extensive readjustments of plant facilities.

ing more accurate temperature control not only in the heating furnaces, but also in the progress of the steel through the mill.

A highly encouraging and significant change in the attitude of the steel maker is that which utilizes more fully the development of methods based upon a scientific approach. Not many years ago the making of steel was a more or less secret art based upon the trained eye and the practical experience of the operator. Today it is realized that slight variability in operations cannot be disregarded as a determining influence affecting the quality of the finished product. The very complex reactions of steel making are affected by many variables not at all occult, but which when understood and controlled as in other physicochemical processes result in a more uniform product.

During the early years of the century the steel maker used ferromanganese or spiegeleisen as his chief furnace or ladle addition. Today the list includes, either as metal or as alloys, two grades of manganese, three grades of spiegeleisen, three grades of manganese and silicon alloys, aluminum and silicon in at least three forms, cobalt, copper, chromium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, along with a large group of special deoxidizers with their several combinations.

Freedom from "sonims," uniformity of character in chemistry, physical properties, surface finish and size, and the meeting of the diverse requirements of modern shop processes which permits of the realization of split-second production schedules, are all desiderata which are increasingly in demand. The greater appreciation of the importance of slag control with reference to the composition and viscosity has led to the systematic regulation in furnace interchange of a closely adjusted basicity and FeO slag content within a predetermined pattern. These controls together with proper alloy additions permit the retention of definite amounts of iron oxide and iron nitride in the steel. The grain size so established permits within economic limits a much more uniform control of hardenability, toughness and iron aging.

Progress in the arts is based not only upon the development of ideas, but also upon the dependable availability of suitable materials at a cost permitting their commercial use. The discovery of the Bessemer process in 1855 was one of the most significant events of that century. A superior material at a lower cost was made available for use in the great physical development of America and the world at large. Following this discovery came that of the acid and basic open hearth. In each instance a product cheaper and superior to iron was made available for the uses of man. The character of these steels was determined largely by their carbon content, ranging from the softest welding steel to the high-carbon tool steels. With their low cost and great adaptability the world moved forward in Gargantuan strides in steel production and consumption, in which movement the United States rapidly attained and has since maintained a premier position.

The ever-pressing demand for steels possessing superior qualities, particularly under the stimuli of World War requirements led to the development of many alloy steels now available. The term alloy steel just mentioned refers to simple, binary, ternary, quaternary, or complex alloys in which one or more alloying elements other than carbon are present in sufficient proportions to modify or substantially and positively improve its properties. This definition would therefore include the pearlitic and stainless steels, the commercial importance of which is very great. It does not include steels in which the alloy or alloys prevent or minimize ills which the steel might possess were the alloying element or elements not present. In the case of the higher alloy steels in which the strength may be double or triple that of simple steels the matter of heat treatment is most important, since the superior properties are due not only to the presence of the alloy but also to proper heat treatment, the means for which progressively

Changes in Processes and Production in the United States
(Data Gathered by the American Iron and Steel Institute)

Year	Basic Open Hearth	Acid Open Hearth	Bessemer	Crucible	Electric	Other	Total Gross Tons	Alloy Ingots
1880		100,851	1,074,262	64,664	.....	7,558	1,247,335	.....
1890		513,232	3,688,871	71,175	.....	3,793	4,227,071	.....
1900		3,398,135	6,684,770	100,562	.....	4,862	10,188,329	.....
1906		10,980,413	12,275,830	127,513	.....	14,380	23,398,136	.....
1909	13,417,472	1,076,464	9,330,783	107,355	13,762	9,185	23,955,021	.....
1910	14,858,353	608,153	9,354,437	107,671	50,821	....	25,154,087	1,013,913
1916	29,616,858	1,788,769	11,059,039	129,692	168,918	604	42,773,680	1,362,615
1920	31,375,323	1,296,172	8,883,087	72,265	502,152	3,535	42,132,934	1,660,292
1923	34,665,021	1,234,636	8,484,088	44,079	515,872	....	44,943,696	2,106,489
1925	37,087,342	947,146	6,723,962	19,562	615,512	....	45,393,763	2,320,390
1928	43,200,483	913,473	6,620,195	7,769	802,260	....	51,544,180	3,214,909
1929	47,232,419	1,120,469	7,122,509	6,645	951,431	....	56,433,473	3,957,207
1930	34,268,316	780,856	5,035,459	2,253	612,599	....	40,699,483	2,317,183
1935	30,361,237	354,192	2,835,031	642	541,492	....	34,092,594	2,119,658

improve, as do also methods of working and welding.

Alloys Open New Markets

Fortunately the industry has recently learned of the many instances in which astounding corrosion resistance, or increased strength with decreased weight, may be obtained by the addition of fractional percentages of the alloys reacting with oxygen and nitrogen. The adoption of these alloy steels in the many mill forms now available should be reflected in higher pay load ratio and increased life due to corrosion resistance when used for railroad, street cars, trucks, water craft, roofing or other purposes.

Another important use of alloy steels, nothing short of revolutionary, followed their adaptation to tool steels. The more recent development of the several types including the cemented tungsten carbide type, along with the growth of consumer machine goods has required the redesigning of machine tools with reference to heavy duty features. The special service machines producing standard commodities at decreased prices, or permitting the development of entirely new lines are now hastening a greatly intensified "machine age," in which a new era of industrial activity through lowered costs of existing commodities and the development of new ones will contribute to ever broadening social satisfactions. It is another example of the coalescence of the requirements of inventive genius made possible by suitable commercially available material. It is a well-known fact that a surface hardness of 1000 Brinell is obtained by nitriding certain steels. Such surface hardness coupled with a ductile core will result in a growing use for any material possessing such qualities. It has been found that some alloy steels also respond to nitriding after their regular heat treatment. The importance of this development in tool and machine maintenance is apparent.

Pearlitic alloy steels are an interesting group due to their typical characteristics and applications. These low-alloy steels offer certain qualities of corrosion and oxidation resistance, high temperature, mechanical properties and stability, varying with the chemical composition. The pearlites, as well known, are used in applications too severe for carbon steels

o o o

THE bessemer converter today may be a comparatively indifferent producer of the country's steel. But its discovery in 1855 was a signally outstanding event of that century. All credit to the bessemer process—it turned out a superior material more quickly and cheaply and thereby contributed greatly to a rapid physical development of America and the world at large.

o o o

Youngstown Sheet & Tube Co.

but find favor for applications not sufficiently severe to require the use of the higher alloy or stainless steels.

The selection of an alloy steel is of course based upon consideration of intended use; these factors may be dynamic strength, corrosion, abrasion, or resistance to rust, heat or fatigue. These several requirements are encountered in primary motors, in oil refining and cracking. In the chemical industry they find use in the manufacture of nitric acid, in the manufacture of pulp or paper, where sodium sulphide is a disturbing factor, as are acids in the textile and dye industries. Again the chromium alloys serve a most useful purpose in furnace parts, rabble arms, glass molds, etc. In their broadening development the artist will find a new and growing field for the expression of his talent, in developing "eye appeal" not only in the smaller products of industry, but also in larger fabrications and in architectural work. The continuing improvement in surface finish by enameling, etching, polishing or coloring are further helpful aids in meeting growing demands for beauty in fabrication or architecture. The transition from the ponderous and unattractive to the light and streamlined, to greater flexibility and portability is one of the distinctive trends of a stylized period.

Due to their longer life the alloy steels will increasingly displace the carbon steels and also decrease the replacement tonnage characterizing the use of the latter steels. In so far as this is effective there will be reduced demands for the basic raw materials—coal, coke, iron ore and carbon steel.

As against this trend there will be uses found by virtue of their special qualities, and a further expansion of the electro-metallurgical industry occasioned by additional alloy requirements. If these observations with reference to alloy steels seem somewhat over amplified, the transgression is permissible because of the profound social and economic influences resulting from their further development and application and their determinative influence upon the future trend of the steel industry.

For the convenience of the reader the accompanying table lists data (THE IRON AGE, Vol. 137, No. I, p. 52) which will assist in showing production trends of the various steel products.

From this table it is seen that the open hearth from its small tonnage of 1900 led all other processes in the record year of 1929, at which time it produced 87.4 per cent of the total output of the country. Bessemer production reached its peak in 1906 and has steadily declined in tonnage and relative importance ever since. Electric steel, entering with normal production in 1916, had by 1935 not only continued its upward trend but relatively exceeded former records. Crucible melting, in the meantime, had been virtually displaced, while the acid open hearth occupied a further subordinate position.

Regarding future tonnage trends, it is manifestly impossible to maintain such ratio increases as those recorded in the decades from 1880 to 1920. It is equally impossible to extrapolate a curve indicating future production, but that the rate of growth is slowing down at an amazing rate is quite evident. Replacement requirements have become more important as compared with new uses. The expanding uses of alloy steels will have a further effect upon replacement. Self-containment policies of other nations will result in lowered export opportunities. Modernization and the adoption of American methods by foreign nations without our high wage scales will be reflected in the competition of world markets. Japan, for example, formerly an important outlet is not only self-contained, but now seeks export markets. Inter-market commodities will further seek supremacy in their various competitive fields. These fundamental changes, gradually, but none the less pregnantly, now affect our internal and external economies, in the serious consideration of which we should find stirring incitement in the formulation of policies vastly different from those characterizing the adolescence of the industry.

The forces motivating the industry have been the struggle for earnings, the pressure of consumer requirements for materials meeting more stringent specifications and the contributions of research work.

In addition to these pressures are those of an intensely social nature. Social progress and the mechanisms of economics have not kept pace with technological progress, a fact which maintains historic consistency. Today there is every evidence that social progress will actively continue until a part of this lag has been taken up. Necessarily evolutional in character the general pattern will contain designs embracing higher wages, shorter hours, severance compensation, old age and unemployment insurance and other features entailing higher production costs.

List of Wasteful Processes

It is axiomatic that any business enterprise which does not operate at a profit cannot indefinitely continue operations, and in its decline will prove a most unprofitable field for capital and labor. The interests of both are dependent upon the value which is added during the process of conversion. Unnecessary costs of any character are a drag tending to retard or prevent consumption. Because of these inescapable facts industry is faced with the necessity of intensifying efforts in developing and installing labor saving equipment, improving processes and the reduction or elimination of waste of any character. In such a limited assessment, any consideration of the problems of power, engineering materials, personnel, sales and distribution, while subjects of great moment, are beyond the scope of this theme.

In the steel industry these wastes may be roughly grouped under the following headings, and since they are generic in character their weighting will vary at different plants:

(1) Waste of Energy:

Fuel and power.
Stack temperatures.
Sunday gas and power waste.
Loss of heat.
Bessemer converter.
Sensible heat of slag.
Sensible heat of hot coke.
Sensible heat of molten iron.

(2) Waste of Material:

Failure to secure the greatest commercial value of waste products, or entirely neglecting the utilization of those now lost.

Failure to utilize the most suitable engineering materials in operation, repair and maintenance.

Unsuitable refractories, which because of character imperfection or unfitness require too

frequent replacement, thus imposing heavy costs not only in material and labor but also in idle plant charges.

Metallurgical progress is now hindered by refractory limitations.

Waste or abuse of materials and tools through careless handling and failure to make partial reclamation when possible.

Wastes occasioned by the use of raw materials lacking proper beneficiation.

Waste or losses at furnaces and mills.

(3) Waste of Time:

Due to inefficient or improperly maintained tools and shop equipment. Inadequate planning.

Due to inaccurate or unreliable information in connection with operations involving temperature and atmosphere control.

In metallurgical operations, such as failure to develop or adopt more rapid and cheaper methods.

Finally, there is the appalling inadequacy of procedure regarding research and the dissemination of its findings. Research in its broad sense includes not only fundamental scientific problems upon which the industry is based, but also the closely related subjects comprising new uses, consumer problems, and sociological problems affecting those associated with the industry and the effects of their impingement upon society in general.

Correlation of Research

Since research is the only means by which enlightened progress may be made it seems appropriate to give it first, if only brief consideration. Research is conducted by a number of agencies the yearly expenditures of which aggregate millions of dollars. These several agencies are educational institutions, engineering societies, research foundations, State and Federal bureaus, to which have been added, in recent years, the laboratories of many corporations. In addition to these organizations there are many older and highly important foreign groups, especially in England, France and Germany. Thus the subject broadens to one of international importance. While the publications of these institutions are available in the original texts to linguists who enjoy access to specialized libraries, the iron and steel industry as such has failed to set up an instrumentality which by continuous collocation of the various scientific publications, either as transactions or technical press publications, could quickly and economically disseminate through a technical monthly or other means the most recent information relating to the various interested subdivisions of industry.

While it is true that much helpful information, especially for those engaged in research, is now available through such publications as the Engineering Index Service, the American Institute of Mining and Metallurgical Engineers, Metals and Alloys, Chemical Abstracts, and others, the fact remains that the industry has not developed an organ directly and specifically serving the requirements of those responsible for the technical progress of such an important basic industry.

The American Iron and Steel Institute as the most representative organization of the industry has since its inception published an annual volume containing all of the technical papers presented during the year. These papers are

(CONCLUDED ON PAGE 45)

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GENERAL research is not monopolistic in function. It is not an end within itself—for findings should be promptly and effectively publicized. There is still an appalling inadequacy of procedure regarding the international dissemination of the results of laboratory investigations.

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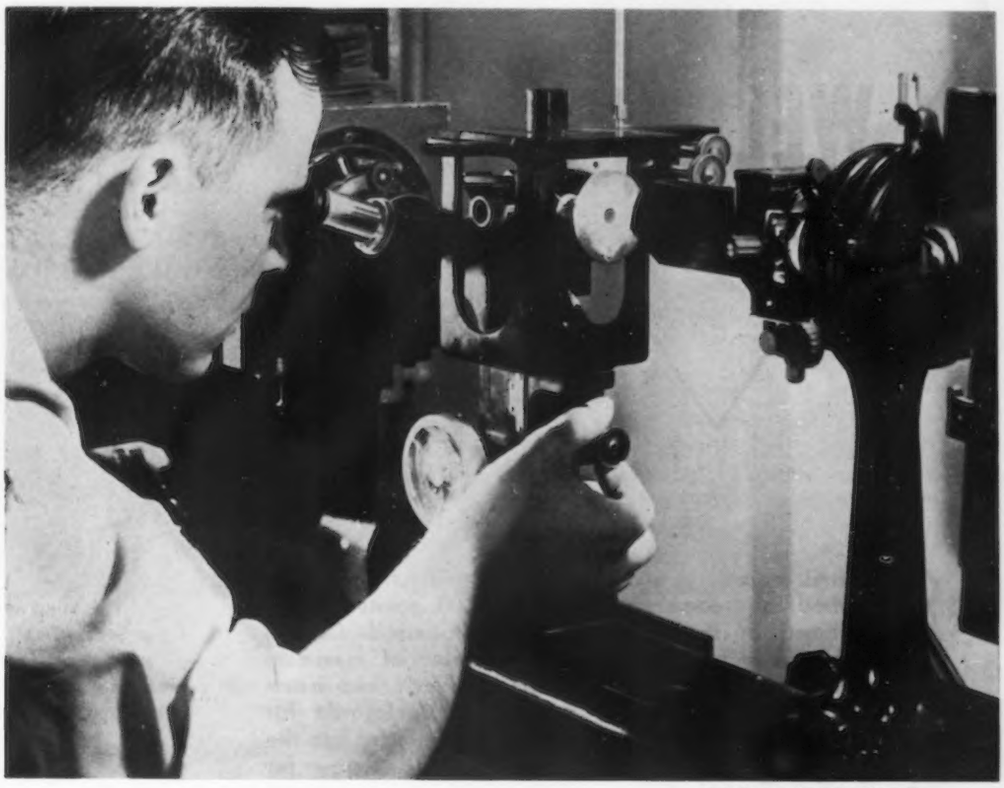

Lindberg Steel Treating Co.

HEAT EFFECT *in* WELDING

• *part two* •

Carbon Steels

By Dr. W. G. THEISINGER

Welding and Metallurgical Engineer
Lukens Steel Co., Coatesville, Pa.

GENERAL objectives and method of research were outlined in the first article. In this second part, Dr. Theisinger discusses the heat effect in welding of five plain carbon steels. For each steel he gives the hardness values for the affected zones, the weld and the plate metal and, in addition, describes and illustrates the microstructure of the affected plate metal adjacent to the weld.

Commercial interest in the heat effect problem centers about the hardening in the metal adjacent to the weld. A limiting hardness variation between weld, hard zone and plate of 100 points Vickers-Brinell is suggested. On this basis, a table of maximum welding speeds has been drawn up. A formula for translating the latter into the minimum heat energy for each steel is given and with this formula a table of minimum allowable heat energy has been calculated, to permit the operator to adjust the amperage, voltage and welding speed to reasonably assure holding the hardness variation in carbon steels within the specified value of 100 points.

HAVING described the manner of making the tests in this study [THE IRON AGE, Oct. 15, page 81], the results of the hardness surveys and microscopic examinations of the following steels will be considered:

S.A.E. 1015 (0.17 per cent carbon)
S.A.E. 1025 (0.25 per cent carbon)
S.A.E. 1035 (0.33 per cent carbon)
S.A.E. 1045 (0.44 per cent carbon)
S.A.E. 1050 (0.53 per cent carbon)

Five hot-rolled plates, ½ in. x 2 in. x 9 in., were selected from each grade and "welded" by depositing a bead on the top surfaces of the plates. One specimen from each grade was so welded at each of the following welding speeds in inches a minute: 4, 6, 8, 12 and 18 in.

The specimens were X-rayed and a section cut from each specimen at a point from 2 to 3 in. from the center of the crater. The section measured ¾ in. along the line of the bead with cross-sectional dimensions of ½ in. x 2 in. One face of the cross-section was polished for microscopic examination by the usual laboratory method and etched lightly with a 1.0 per cent Nital reagent. The etchant was employed to reveal the heat-affected zones so that the hardness survey would not fail to pick out the significant points lying in an extremely narrow area, since the greatest hardness occurs in a zone confined to seldom more than 0.10 in. in depth.

Hardness Recorded in Graphic Form

The Vickers hardness testing machine was used in this research as it permits the locating of impressions as close as 0.02 in. apart and even as close together as 0.01 in. in very hard material. The hardness surveys were made in accordance with the plan illustrated

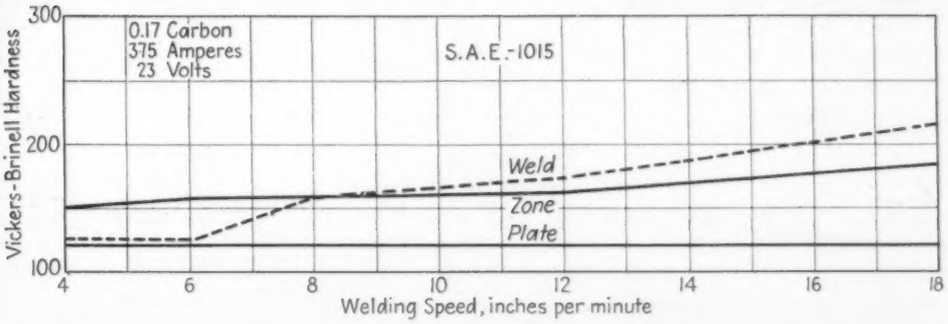

FIG. 7—S.A.E. 1015 (0.17 per cent Carbon) Maximum allowable welding speed based on 100 points Brinell—18 in. per min.

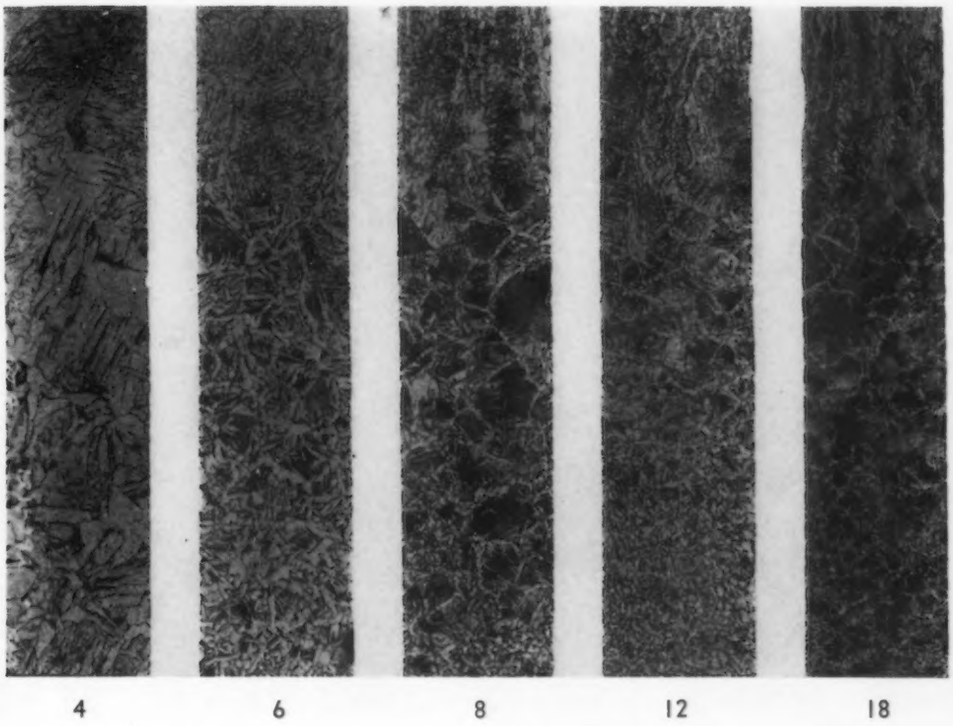

FIG. 8—S.A.E. 1015 (0.17 per cent Carbon) 150x—1.0 per cent Nital. Four, 6, 8, 12, 18 in. per min. welding speed. Pearlite to sorbite with decreasing grain size.

in Figs. 1 to 5 inclusive, appearing in the previous article. An average of 80 impressions and readings were made on the cross-sections of each specimen. The usual method of reporting these figures was to plot them in the form of a graph and superimpose these curves on the macrograph of the welded specimen, as, for example, in Fig. 1. Such a record supplies useful information for individual specimens, but when more than a hundred specimens representing a hundred different conditions of welding or plate composition are to be reported, the material becomes too bulky. Furthermore, it fails to present comparative data which can be readily assimilated. In order to fulfill this need, the Vickers-Brinell hardness values are recorded in graphic form as illustrated by Fig. 7.

All hardness results are plotted against welding speed in inches a minute. The solid straight line indicates the hardness of the unaffected plate material. The solid sloping line illustrates the changes in hardness of the hard zones resulting from variations in welding speeds, and the broken line shows the representative hardness of the weld metal.

The method adopted of arriving at the figures used in these curves will become clear by referring to the preceding macrographs in Figs. 1 to 5 and to the accompanying graph, Fig. 11. For the welding speed of 8 in. a minute, the hardness value which is representative of the major portion of the weld, lines *B* and *C*, is 160 Vickers-Brinell. The five readings in the hardened zone show an average of 176 and the unaffected plate metal is 140. These figures are given below in Vickers-Brinell hardness values:

Weld 160
Zone 176
Plate 140

They may be found by referring to Fig. 11 for the welding speed of 8 in. a minute. All the values for the remainder of the specimens plotted in this chart as well as the other illustrations given are obtained in this manner.

Plate Composition a Powerful Variable

As the curves are studied, it soon becomes evident that plate composition, especially carbon content, is a powerful variable in affecting the responsiveness of the parent plate to the welding conditions. When comparing the hardness of the deposited welds, it must be kept in

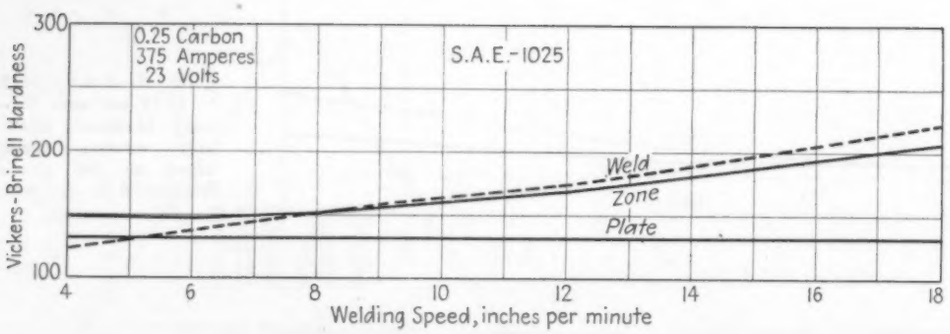

FIG. 9—S.A.E. 1025 (0.25 per cent Carbon). Maximun allowable welding speed based on 100 points Brinell, 18 in. per min.

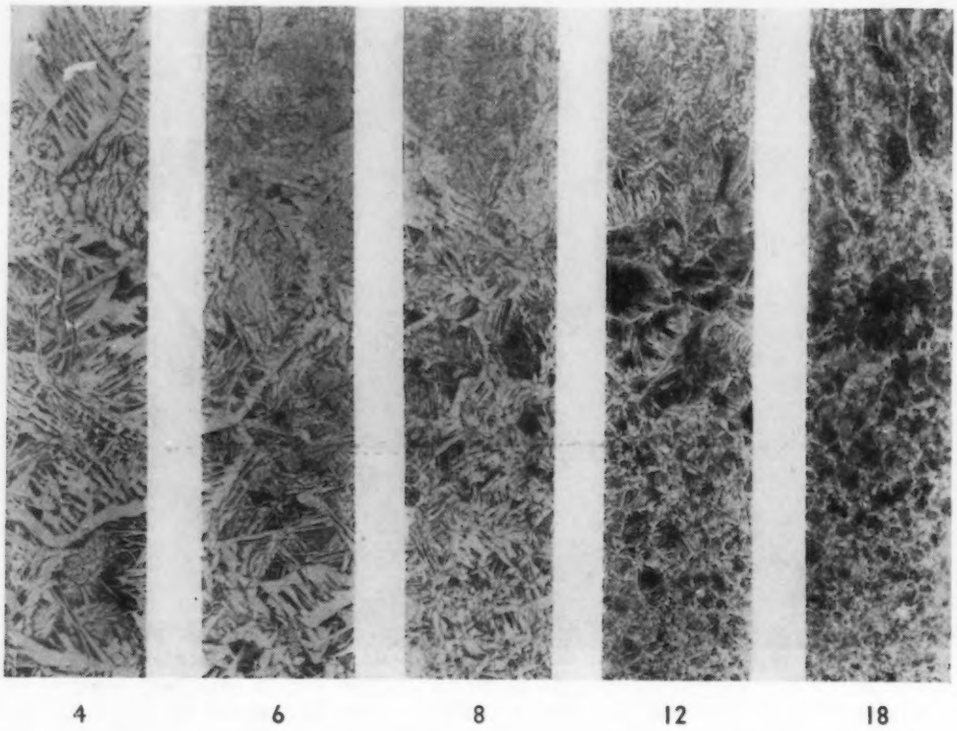

FIG. 10—S.A.E. 1025 (0.25 per cent Carbon) 150x—1.0 per cent Nital. Four, 6, 8, 12, 18 in. per min. welding speed. Pearlite to sorbite with decreasing grain size.

mind that these beads were deposited by a bare arc and were thus subject to the influence of the effects of nitrogen and oxygen retained by the molten metal in its passage through the arc stream.

The effect of increasing welding speeds manifests itself in increasing hardness of both the weld and the hard zone for all steels reported herein. This statement is confined to general terms, since there are only slight differences in hardness between specimens welded at 4 in. a minute and those at 6 in. a minute. As the speed of welding is increased, amperage and voltage being constant, the cross-sectional area of the deposited bead decreases proportionately. This may be seen in Figs. 1 to 5 inclusive. Further, since the heat energy per length of weld decreases with increasing welding speed, the heat gradient becomes steeper or more localized and the cooling action on the heated metal is more intense.

Plate Metal Acts As Quenching Medium

The plate metal acts as the quenching medium on the weld and adjacent base metal in dissipating the welding heat. Thus those steels which possess great hardening power should be dealt with in welding in a manner consistent with good heat-treating practices for that particular grade of steel. For in such steels, drastic quenching from temperatures in excess of the critical range produces high hardness values in the treated plate.

In welding, the melt temperatures attained are far beyond those employed in ordinary heat treatment and the rate of cooling of this deposited metal from liquid to solid state and below the transformation points likewise surpasses the usual quenching rates. This may be observed by simply striking an arc without any attempt at laying a bead. The globule, in less than a second, has passed from solid to melt and returned to solid state again. One's hand may be placed within a fraction of an inch of it before any heat in the surrounding plate is perceptible to the touch.

This we might term as the maximum cooling rate or, for our purpose, our most rapid welding speed. Here the welding heat is localized and confined to a very small area of the plate metal adjacent to the "weld." If, on the other hand, the electrode movement is only downward so as to maintain the arc and feed the bath, the surrounding plate metal becomes heated as the

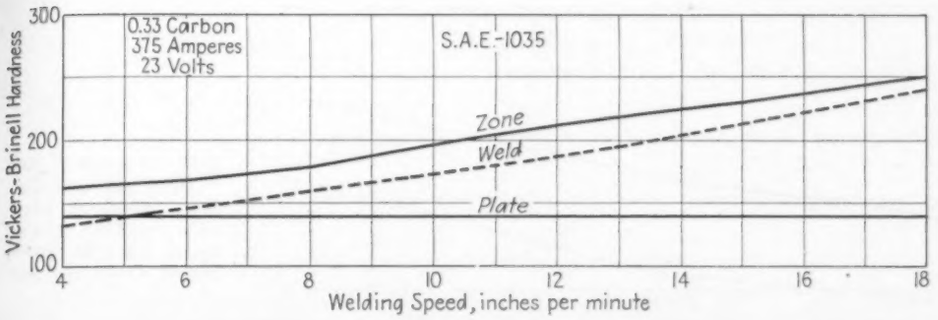

FIG. 11—S.A.E. 1035 (0.33 per cent Carbon). Maximum allowable welding speed based on 100 points Brinell, 16½ in. per min.

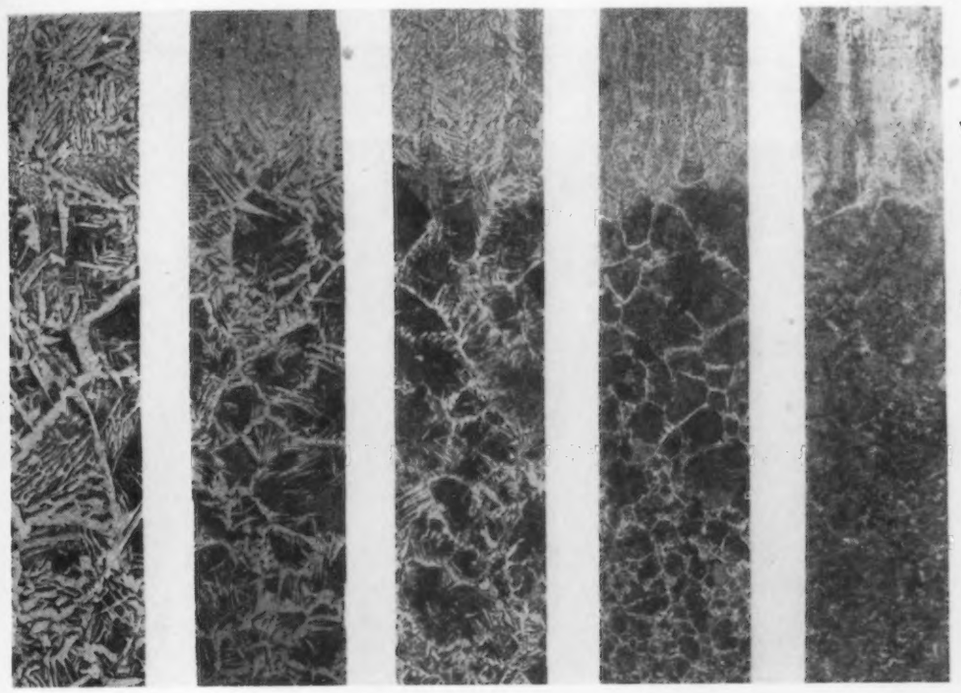

FIG. 12—S.A.E. 1035 (0.33 per cent Carbon) 150x—1.0 per cent Nital. Four, 6, 8, 12, 18 in. per min. welding speed. Pearlite to fine grained sorbite.

welding heat is conducted farther and farther into the plate. When this large globule solidifies, it and its adjacent plate metal do so in a "preheated" mold of plate metal and the cooling rate is less drastic than that described above. This puddled crater we may call our slowest speed of welding. Between these two conditions lies the range of normal arc welding practice.

Welding Speed Selection Influenced by Carbon Content

No doubt there are many reasons for the selection of a particular speed of welding, an important one being the commercial objective; yet from a metallurgical viewpoint the major factor influencing the selection of welding speeds would be the hardening power of the steel to be welded. The most common alloying element which contributes to the hardening of iron is carbon. The result of varying amounts of carbon in steels is shown in the accompanying charts and photomicrographs.

The effect of increasing carbon content on the plate metal adjacent to the weld and the weld metal itself establishes this element as the most influential variable to be dealt with in welding. The hardness of both the affected plate and the weld increases under all conditions as the carbon content of the base metal is increased. This is as it should be and is strictly in accordance with the principles of metallurgical practices and heat treating.

In summarizing the data appearing on these hardness charts, as the carbon content of the plate increases, the welding speed should be decreased or the amperage increased.

This suggestion is concerned with the variations between the affected or hardened zone and the as-rolled plate metal. At the lower welding speeds, the hardness of the weld drops below the plate hardness because a low carbon base electrode was employed. However, it is safe to assume that with the use of a suitable high-strength rod, the weld hardness would usually keep pace with the hardness of the affected plate.

While stress relieving will reduce the hardness in the metal adjacent to the weld, this beneficial treatment is not and often cannot be given to many of the welded structures at present. Being aware that such hardness values as shown herein are present in the welding of these steels, it seems reasonable

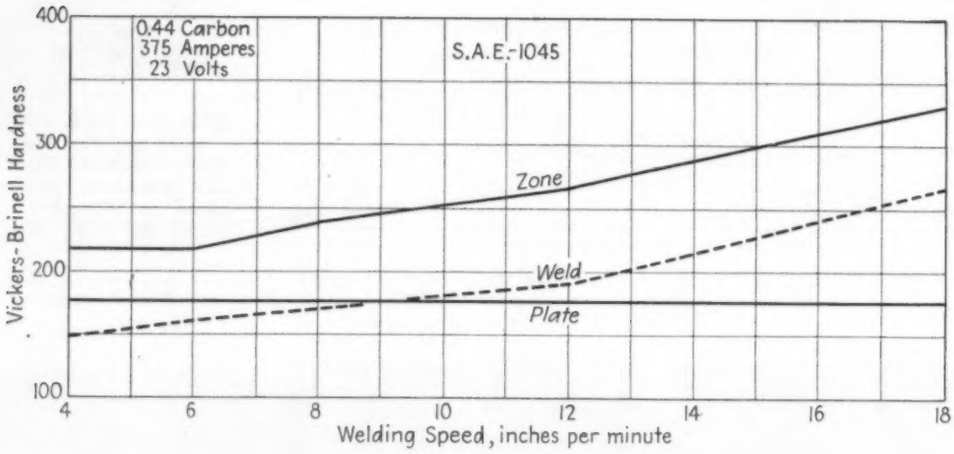

FIG. 13 — S.A.E. 1045 (0.44 per cent Carbon). Maximum allowable welding speed based on 100 points Brinell, 13 in. per min.

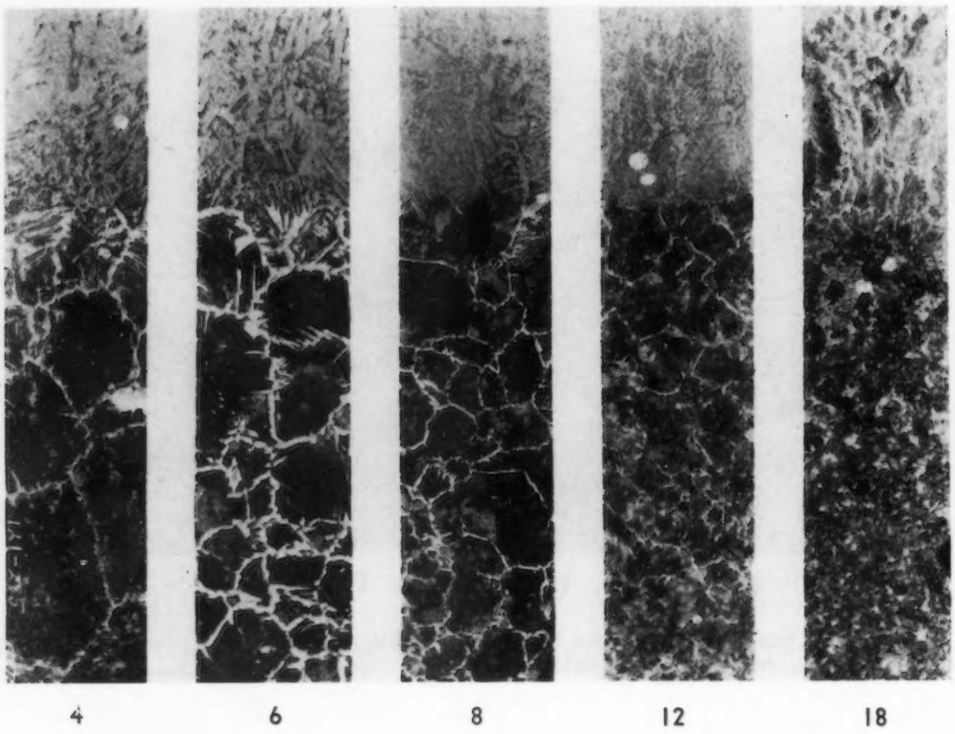

FIG. 14—S.A.E. 1045 (0.44 per cent Carbon) 150x—1.0 per cent Nital. Four, 6, 8, 12, 18 in. per min. welding speed. Pearlite through sorbite to troostite with troostite containing patches of martensite (see 18 in.).

that some effort should be expended in keeping this effect at a minimum.

Limiting Hardness Between Hard Zone and Plate

The point which this study hopes to bring to light is the suggestion of some limiting hardness between weld, hard zone and plate, especially between the latter two, that will have an influence in fixing the welding conditions for various carbon and alloy steels. Certainly some line must be drawn restricting the variations in hardness between these areas beyond which it is considered unsafe practice to trespass.

No doubt it will be a matter of opinion as to what range of hardness values should be permitted. This choice must be left to the judgment of the engineer until such time as further research will produce the defining terms. For the sake of comparison let us select an arbitrary figure of 100 points Brinell, or to be more explicit, where higher hardnesses are found, 100 points Vickers-Brinell as the limit of permissible variation. This variation is the difference at the maximum welding speed which shows no greater differences than 100 points Vickers-Brinell between the unaffected plate, weld and hard zone.

With the exception of the higher speed welds on the 0.17 per cent and 0.25 per cent carbon where the hardness of the weld metal is greater than that of the hard zone and in the lower speeds in the higher carbons where the hardness of the weld falls below that of the unaffected plate, the real difference in hardness is confined to values lying between the hard zone and the unaffected plate metal. This is fortunate for the comparison made below because we can discuss the variations in hardness between the hard zone and the plate and, in general, apply the data to the field of metallic arc welding as

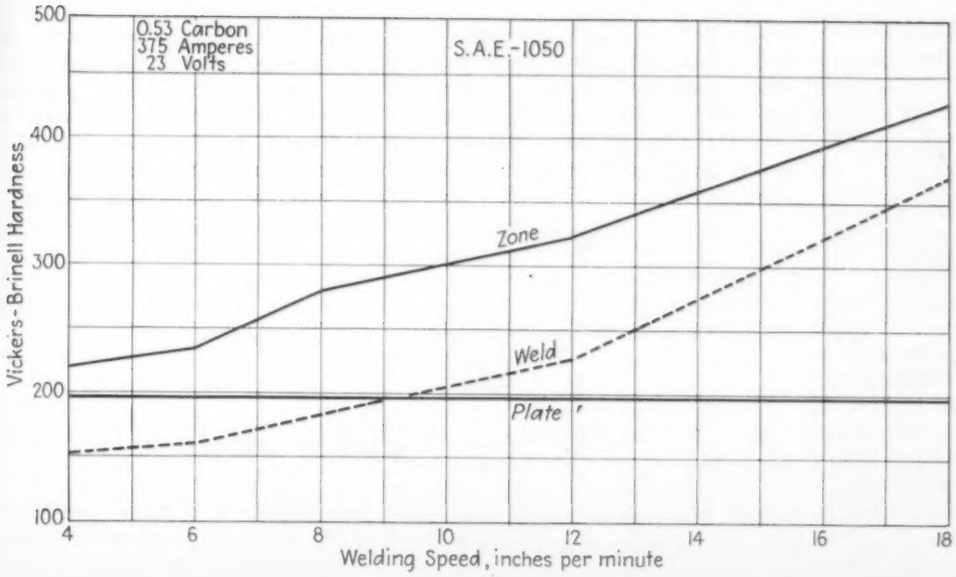

FIG. 15—S.A.E. 1050 (0.53 per cent Carbon). Maximum allowable welding speed based on 100 points Brinell, 9 in. per min.

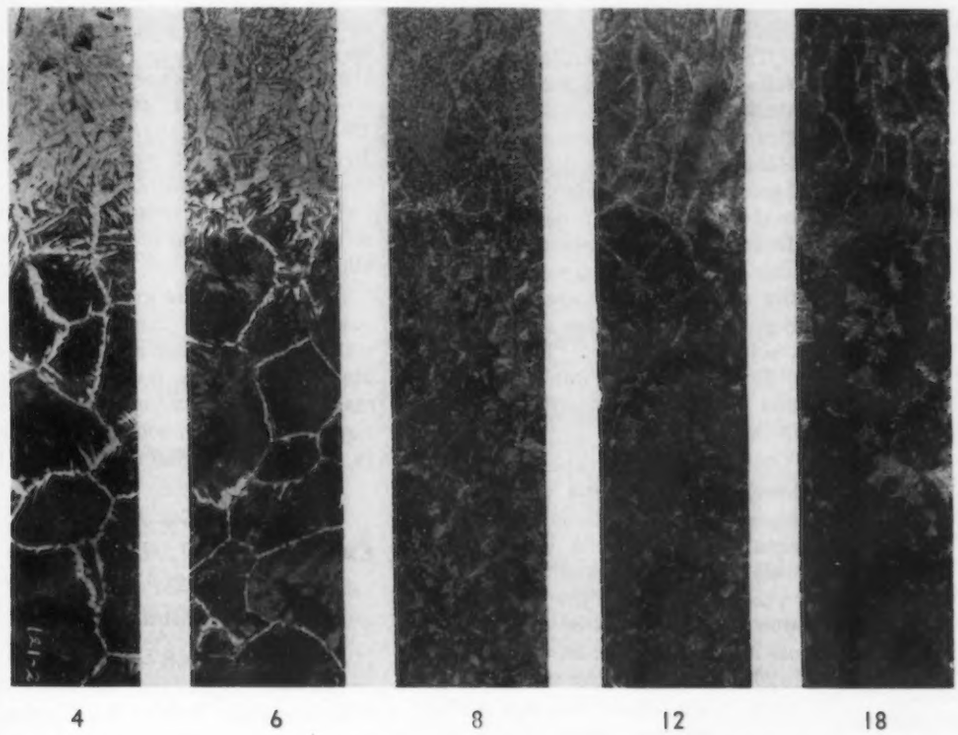

FIG. 16—S.A.E. 1050 (0.53 per cent Carbon) 150x—1.0 per cent Nital. Four, 6, 8, 12, 18 in. per min. welding speed. Sorbite to troostite and troostite with patches of martensite (see 18 in.).

long as a normal grade of electrode is employed for each type of steel.

Examples will be included later to show the result obtained with the use of covered electrodes as compared with a similar series welded with bare wire electrodes.

Maximum Welding Speeds

On the basis of a difference of 100 points Vickers-Brinell between hard zone, weld and plate, the maximum welding speed for each grade of steel is given in the following. At welding speeds greater than the allowable welding speeds listed, the differences are more than 100 points.

Grade of Steel	Maximum Allowable Welding Speed
S.A.E. 1015	18 + in. per min.
S.A.E. 1025	18 in. per min.
S.A.E. 1035	16½ in. per min.
S.A.E. 1045	13 in. per min.
S.A.E. 1050	9 in. per min.

These welds were made at 375 amperes and 23 volts. Here we have an excellent example of the superiority of heat energy units (Joules) in arc welding speed, amperage and voltage as expressions of welding conditions which produce the hardness values shown on the chart. Heat energy data in Joules per inch may be obtained by the use of the formula:

$$\frac{\text{Amperage} \times \text{Volts}}{\text{Welding Speed in./min.}} \times 60 = \text{Joules/in.}$$

By this equation the above maximum allowable welding speeds for each type of plain carbon steel is translated into the minimum heat energy for each steel. For values

less than these listed, the difference in hardness between hard zone, weld and plate will be greater than 100 points Vickers-Brinell.

Grade of Steel	Minimum Allowable Heat Energy
S.A.E. 1015	— 28,750 Joule/in.
S.A.E. 1025	28,750 Joule/in.
S.A.E. 1035	31,360 Joule/in.
S.A.E. 1045	39,800 Joule/in.
S.A.E. 1050	57,500 Joule/in.

With these figures, the operator may now adjust the amperage, voltage and welding speed to keep within the requirements and be reasonably sure of holding the hardness variation in carbon steels between hard zone, weld and plate within the specified value of 100 points Vickers-Brinell. If 100 points variation is considered excessive, then the allowable welding speeds must be decreased or the heat energy per unit of weld increased.

If we limit the hardness variations over the affected area to less than the figure suggested above, the range of welding variables is restricted. This fact becomes more pronounced as the alloy steels are studied where, for example, S.A.E. 4130 is definitely superior to S.A.E. 4150 by allowing a greater latitude of welding conditions. As a matter of fact, if 60 points Brinell is the permissible variation, the former may be welded at 12 in. a minute, whereas the higher carbon grade is practically eliminated regardless of speed of welding.

Hardness Values and Microstructure of Metal Adjacent to Weld

Returning to the subject matter of this part of the research, we take up the hardness curves of each of the plain carbon steels in this series. In addition to the hardness values for the affected zones, weld and plate metal, at each of the five welding speeds there is also a photomicrograph opposite showing the microstructure of the affected metal adjacent to the weld. The photomicrographs were taken over a length of 0.05 in. on the specimen from within the weld, through fusion line and the hardened zone. The magnification is 150 times the actual distance as measured on the specimen. All the illustrations were obtained at the bottom of the weld along line *C* (Figs. 1 to 5).

For example, in Fig. 8 the extreme top of the photomicrograph for each of the five specimens reveals a portion of the weld near the fusion line, the fusion line or area appears just below this in the upper half of each illustration, and the affected or hardened plate metal adjacent to the weld is seen in the lower half of the views.

As may be expected, the structure of the metal in both the weld and plate takes on the transition constituents of a type and nature depending upon the speed of welding; in other words, conforming to the rapidity of the quenching action. Where large-grained pearlite appears, we find low hardness in the metal adjacent to the weld. Likewise, as will be described under Certain Alloy Steels later, a Vickers-Brinell hardness of 642 is indicative of a martensitic structure and such was found, as will be shown in the photomicrograph of that specimen.

The Several Carbon Steels

S.A.E. 1015—Hardness curves Fig. 7, Photomicrographs Fig. 8 (150x—1.0 per cent Nital etch)

This 0.17 per cent carbon steel falls in the range of structural steels of 55,000 lb. per sq. in. tensile strength in thickness under ½ in. Heat treatment has little effect in hardening this grade of steel due to its initially low hardening power. Thus we would expect to find little change in hardness, regardless of the cooling rate or speed of welding. Such is the case as shown by the hardness curves. The greatest difference between weld, hard zone and plate is 93 points Brinell at 18 in. a minute.

The photomicrographs reveal the lower portion of the weld at the top of the illustrations, the fusion area just below the base of the weld and the affected plate metal in the lower half of the views. The slow welding speed of 4 in. a minute at 375 amp. and 23 volts results in slow cooling of the weld and affected plate. Here the large grains are indicative of the cooling conditions as well as the high temperatures attained. The microstructure at any of the welding speeds is of no higher order than sorbite, and it is apparent that this constituent is visible only in the 18-in. specimen. In the other specimens, the difference to be noted is the decreasing grain size as the welding speed is increased.

S.A.E. 1025—Hardness curves Fig. 9, Photomicrographs Fig. 10 (150x—1.0 per cent Nital etch)

Although an 0.25 per cent carbon steel is slightly higher than the structural range of carbon steels, it is a grade of material that is being welded for many of the higher tensile strength requirements. The cooling rate from above the critical range or, for our use, the speed of welding, has no more effect on this than it had on the previous type of steel. The greatest difference is at 18 in. a minute, where it is 94 Brinell. It is interesting to note that the variation in hardness between the three areas at 8 in. a minute is less than 25 points Brinell.

Some idea of the grain size that can be obtained from the slow welding speed is seen at 4 in. a minute. The tendency toward the formation of sorbite is more pronounced and is much in evidence in the 18-in. specimen.

S.A.E. 1035—Hardness Curves Fig. 11, Photomicrographs Fig. 12 (150x—1.0 per cent Nital Etch)

At 0.33 per cent carbon we approach the upper limit of the safe welding steels insofar as hardening power is concerned. When the several types of steels are studied, it will be noticed that beyond 0.33 per cent carbon the hardness curves mount rapidly away from the base metal values (may be seen in Fig. 6).

The photomicrographs do not reveal a hardening constituent of a higher order than fine-grained Sorbite shown in the 18-in./min. specimen. Certainly this grade of steel can be classified as a weldable type, at least from a metallurgical viewpoint.

Practically, the welding characteristics of this steel were the best of any of the plain carbon steels. This experience has to do with steadiness of the arc, regardless of

the welding speeds. Some steels required very careful adjustment of electrode feed and arc voltage control, and often each speed had to be tried again and again in order to obtain a steady run throughout. But this 0.33 per cent carbon steel responded nicely to any setting of the welding speeds. There was much less trouble from this standpoint below 0.33 per cent carbon than there was found as the carbon increased beyond this figure.

S.A.E. 1045—Hardness Curves Fig. 13, Photomicrographs Fig. 14 (150x—1.0 Per Cent Nital etch)

In this steel is found the first evidence of the higher hardening constituents. Sorbite, troostite and troostite with patches of martensite are visible. Such structures are indicated by the hardness values obtained, especially at the faster welding speeds. Lowering the speed of welding or increasing the current keeps this steel within the allowable hardness variation.

S.A.E. 1050—Hardness Curve Fig. 15, Photomicrographs Fig. 16 (150x—1.0 Per Cent Nital etch)

The affected zone is responding to the heating and cooling, as would be expected from this carbon content. The weld metal increases in hardness over that developed in the welds of the lower carbon steels by virtue of the carbon from the plate metal making up a portion of the weld. This weld metal therefore is hardened appreciably by drastic quenching.

The microstructure is at least sorbitic and, at a welding speed of 8 in. a minute, shows a sorbito-troostic structure. At the 12-in. speed, the hard zone is completely troostite and becomes partly martensitic in addition to the troostic ground mass in the 18-in. specimen.

Surely this type of steel demands a more careful handling of heat energy input in order to reduce the hardness in the affected zone. It can be readily appreciated that beyond 0.50 per cent carbon each increase in this element requires more and more attention.

Summarizing the data obtained from this study, at least one fact seems apparent: that as carbon content of the plate metal increases the heat energy input per unit of weld should be increased. This may be done by increasing the amperage or reducing the welding speed. Further, for the purposes of this research, the most uniform hardness between weld, hard zone and plate was obtained at the welding speed of 8 in. a minute, at 375 amp. and 23 volts or a heat energy value of 64,700 Joules per inch. Regardless of the composition of the steel tested, this figure is generally the best all-around value.

(TO BE CONCLUDED)

Random Thoughts of an Idle Steel Man

(CONCLUDED FROM PAGE 37)

presented by leading experts of the industry, frequently at the expense of much time and research on the part of the authors. To date not a single volume of these proceedings goes further than listing the title and name of the author. Not a volume has been indexed, and no general index of the proceedings has been published. The comparative unavailability of this information and the needless waste of time in digging data or exhaustively pursuing a given subject as covered by this well of information are perhaps realized only by those who have occasion to use it as source material—a keyless treasury.

The citation while specific is relatively insignificant when compared with the extensive and valuable contributions of the domestic and foreign publications, which are not now economically available in terms of utility, time or cost. General research is not an end within itself; its findings should be promptly and effectively publicized. Neither is it monopolistic in function. Since the by-product coke oven and all of our metallurgical processes, other than the Aston process, are of English or Continental origin, cooperation and quicker methods of transfusion could scarcely be regarded as only a beau geste. The easier and fuller availability of pertinent technical information for operating executives would greatly inspire and stimulate a highly important group, to the advantage of the individual, the industry and society. It is difficult to conceive of any plan requiring a similar expenditure which would yield such generous returns. Only it is more difficult to understand why it has not been done.

Ed. Note: In this, the first part of a two-section article, the author has sketched the technological growth of steel making in the United States. Particularly interesting are the several paragraphs which list a number of wasteful procedures. Next week a number of specific items which could contribute to lower steel costs will be itemized and discussed in detail.

Auto Industry Saves $60,000,000 on Steel

AUTOMOBILE manufacturers will pay $60,000,000 less for steel for car bodies this year than they would have spent for a like tonnage about 10 years ago, according to estimates made by the American Iron and Steel Institute.

The saving reflects the 30 per cent decline in the price of high grade, auto body sheet steel since 1926, when the continuous rolling mill was introduced.

Steel has been growing steadily more prominent in modern automobiles. The average increase in the use of steel per car in 1937 models is estimated at 65 lb. compared with one year ago. If expectations materialize for a 5,000,000-car output next year, total steel consumption by the motor industry will exceed all previous records.

Fully 80 per cent of the weight of the average car is steel, although only a small fraction of the purchase price, probably not more than $60, is represented by the cost of the steel.

It is estimated that 125 different types of steel are used in the modern automobile, and that the use of alloy steel has cut in half the weight of the average car over the last 20 years.

THE ECONOMICS OF INDUSTRIAL POWER TRANSMISSION

o o o

By FRANCIS JURASCHEK

Consulting Editor, The Iron Age

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NOWHERE in the average industrial plant today do so many real opportunities exist to reduce the costs of manufacturing as in the realm of power transmission. For this is the heart of the modern factory. When this heart is properly proportioned and functions at a pitch of highest efficiency, production *flows* at high quality and in good quantity, materials are handled and worked upon with economy of motion, machinery possesses the mobility required by the necessities of changing production schedules, the requirements of safety and good lighting are served, and maintenance charges minimized.

At first glance this may seem to be a large statement. It appears to be so only because so little consideration has been given in the past to the inter-related effects of the transmission system upon production flow, motion economy, materials handling, maintenance, safety and the lighting problems in the plant. It is because so many power transmission installations have been made *without* regard to these effects that some half a billion dollars annually are still being wasted between the source of power and its useful application to machinery.

It is not enough to consider that a particular machine, or a group of machines, or even all the machinery in a plant is driven by the most modern means; that power is distributed to these machines with high efficiency; that transmission equipment maintenance has been cut to the bone. Looked at purely as a problem in power transmission, the set-up may be ideal, yet that same set-up when looked at from an all-around production viewpoint may be a misfit.

Production economy is the true criterion, and into that enter factors which cover every phase of manufacturing. Production flow, and quantity and quality of production exercise a determining influence on the power transmission problem, just as, conversely, the power transmission system exercises a determining influence upon these and other factors. The inter-relationships of all must be considered intelligently in planning a really effective transmission system.

To illustrate: In an Eastern plant manufacturing a chemical product, 129 machines of various types had been driven from over-

FIG. 1—View in the steel pulley shop of the Dodge Manufacturing Corp., showing special box truss construction to support group drive lineshafts.

head line-shafting by four motors. Up to a few years ago, while the plant was operating at capacity day after day, total manufacturing costs were about one dollar a pound. The market then was good and the management satisfied. In the later depression years the market fell off sharply and production had to be curtailed to about 25 per cent of plant capacity. The existing arrangement of the machine drives (as in most old-fashioned line-shaft systems) made it necessary to operate a great deal of transmission equipment to run the few machines required for curtailed production. Early in 1935 the management decided to individually motorize every machine in order to overcome this handicap, for manufacturing costs had meanwhile run up to over $1.10 per pound and profits were heavily hit. They believed that unit drive would permit the plant to be operated economically at *any* percentage of capacity. Power costs were carefully figured, and even with the fixed charges incident to

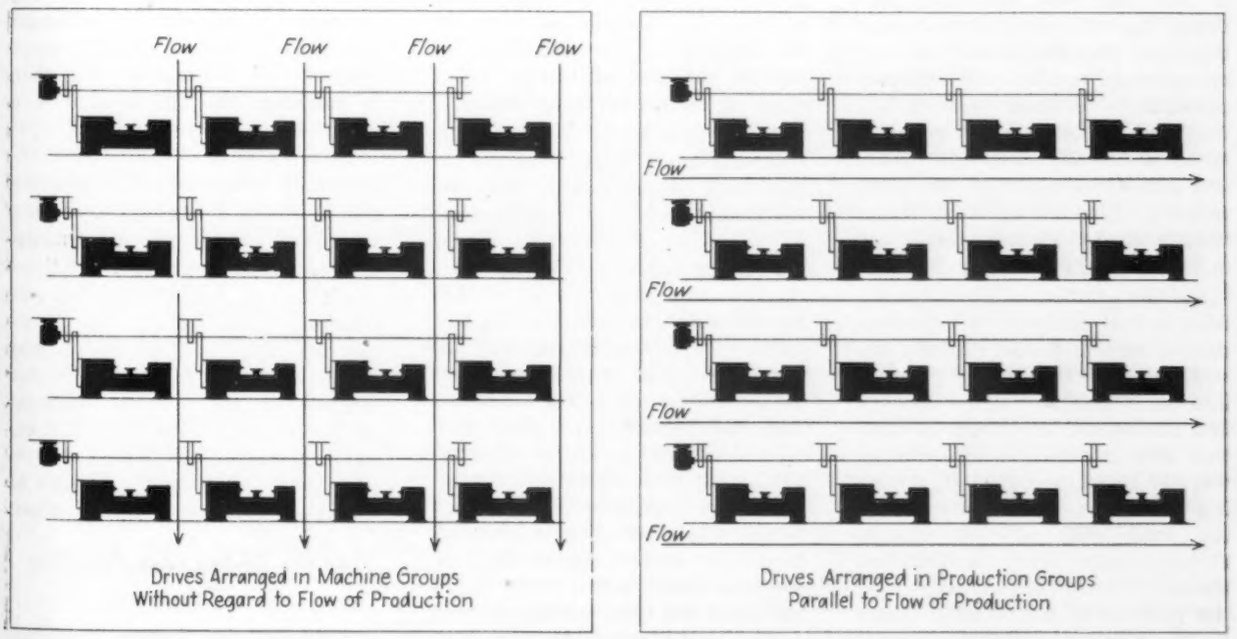


FIG. 2—Illustrating the advantage of considering the flow of production in planning transmission drives.

the investment required to install the individual motors, it appeared that the final cost of driving the machines would be lowered.

Before the individual motor drive installation was made, however, the management was induced to consider one more plan. This plan contemplated the driving of the machines in the plant by groups arranged in the most logical order possible. A preliminary study showed that the investment cost of this plan was less than two-thirds that of individual motorization, and that the power costs of operation at various predetermined percentages of plant capacity less than full would be about equal to those under the unit drive plan, and considerably less at full plant capacity. The management thereupon decided to consider this group drive plan very carefully.

Further studies, to determine the most logical grouping of machines, showed certain faults, hitherto unseen, in the existing flow of production. A careful analysis of ways and means of improving production flow brought to light better ways of handling materials, involving less labor. As a consequence, the final plan of transmission changes took into consideration these other factors equally with the problem of distributing power to the machines, with the result that 24 group drives were installed, production flow and materials handling simplified, less labor was required, the forces retained had their work made easier, their satisfaction at the lightening of their labors reflected itself in greater care, resulting in both better quality and increased quantity of production, and, while power costs will not be materially lowered until the plant reaches capacity production again, the manufacturing cost per pound of material has been cut to around 70 cents. With all this the investment costs of the changes made amounted to but 70 per cent of the projected costs of individual motorization.

This would seem to be an exceptional case. That it is not so has been proved many times by the modernization work undertaken in hundreds of industrial plants during the past few years. Once the principle is firmly grasped that transmission problems contain economic characteristics as well as purely technical aspects, and that the economics of power transmission are inextricably linked with related general problems of manufacturing and cannot be considered apart from them, the approach to the whole situation is clarified. In greater or less degree the conditions outlined above in the chemical plant are true in every factory in the land. A relatively few managements have already worked out their problems, and as a result have lowered production costs amazingly. In the large majority of cases, however, much remains to be done; and one of the principal difficulties lies in a lack of competent transmission engineers who have sufficient knowledge of general manufacturing problems to advise managements thoroughly and conscientiously. The average transmission man employed in a plant has had his schooling in maintenance of existing equipment; the average transmission equipment salesman is quite naturally more interested in selling his line than in working out the details of a comprehensive transmission system; the average utility power engineer is interested in increasing the electrical load; and there are very few real consulting transmission engineers anywhere. Yet these conditions do not indicate that satisfactory solutions are not to be had for any plant problem; they do indicate the need for greater interest on the part of management and the desirability of management asking questions over and over until the economic factors of any plan stand out crystal clear.

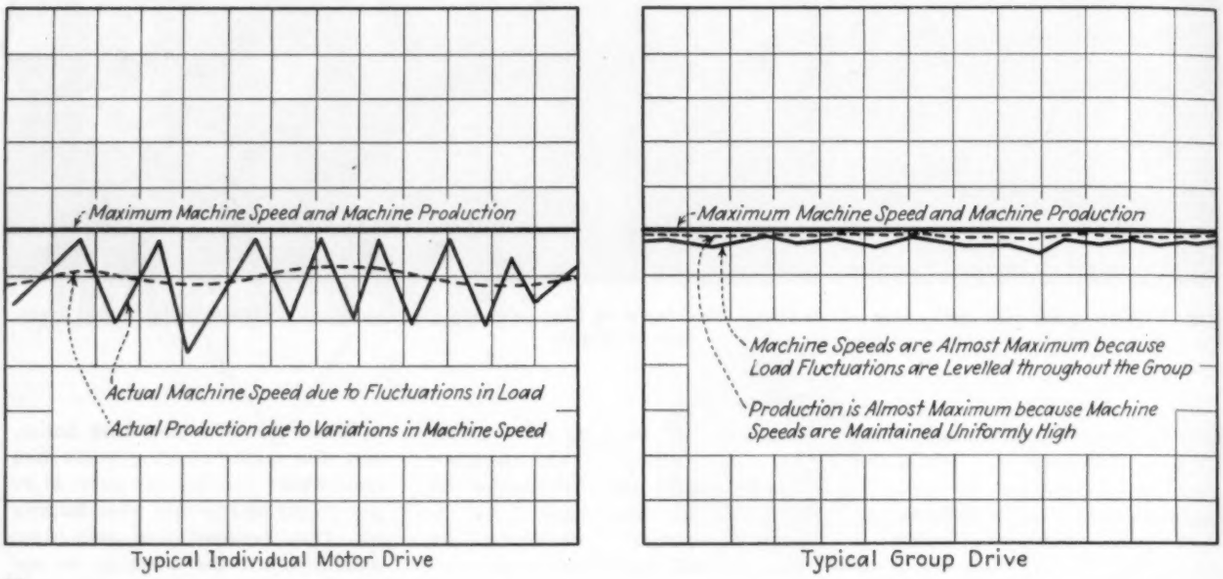

Maximum Machine Speed and Machine Production
Actual Machine Speed due to Fluctuations in Load
Actual Production due to Variations in Machine Speed
Typical Individual Motor Drive
Maximum Machine Speed and Machine Production
Machine Speeds are Almost Maximum because Load Fluctuations are Levelled throughout the Group
Production is Almost Maximum because Machine Speeds are Maintained Uniformly High
Typical Group Drive

FIG. 4—Loads are averaged when logically grouped, hence machine speeds are uniformly higher and production is increased.

At the Dodge Manufacturing Corp.

Recently the Dodge Manufacturing Corporation moved a steel

pulley plant which had been maintained for years at Oneida, N. Y., to its main plant at Mishawaka, Ind. G. C. Miller, Jr., describes the comprehensive studies made by the management prior to the move in these words: "In working out the transmission set-up the engineers in charge of the job took into consideration these important factors: 1—The types of machines to be operated; 2—What the operation of each machine was; 3—Each machine's relationship to others in the progressive or routing method of manufacture; 4—The comparative operating time of each machine, that is, which machine ran for long periods of time and which only occasionally; 5—The power requirements of each machine; 6—The total amount of power necessary to operate the entire shop; 7—The relative advantages of the group and individual drive methods of drive; and 8—The construction of the building in which the new shop was to be installed." In making the layout, the whole shop was divided into four departments in such a way as to facilitate the routing of material through in a progressive series of operations, with the least handling of materials, and with the utmost economy of motion throughout the work. Sixty-seven machines were group driven, and 11 individually motor driven.

Production Flow Considerations

Because of the care with which the entire situation was studied prior to making the installation, work progresses through the shop in a natural, orderly fashion, and manufacturing costs are considerably lower than in the former Oneida plant. One of the reasons for this is the intelligent application of group drive principles. The 78 machines in the shop are now driven by a total of 143.5 motor horsepower, or an average of 1.83 hp. per machine. Had individual motors been used, the total would have been 404 installed motor horsepower, operating at a load factor of 35 per cent. The 16 motors as installed cost $3,320; 78 individual motors installed would have cost $14,013. Over $1,600 per year is thus saved in fixed charges on this one item of equipment, while actual power costs are considerably less. (See *Industrial Power*, February and March, 1936.)

Wherever careful analyses have been made of the successive steps of a manufacturing operation, from raw materials to finished product, the charting of the *flow* of operations has invariably shown possibilities for the elimination of waste motion. The most obvious wastes, of course, will be in the matter of handling materials and work in process, for a study of the routing of work from one machine to another, or from one process to another, makes it possible to arrange a sequence in the most logical order to cut down the handling operations. This sequence is affected by the limitations of space in which the machines may be laid out, and also by the vital question of getting power to the machines most economically. The power transmission system should parallel the flow of production, and wherever possible should be organized in such a way that a unit of the transmission system will correspond with a production unit of the machines.

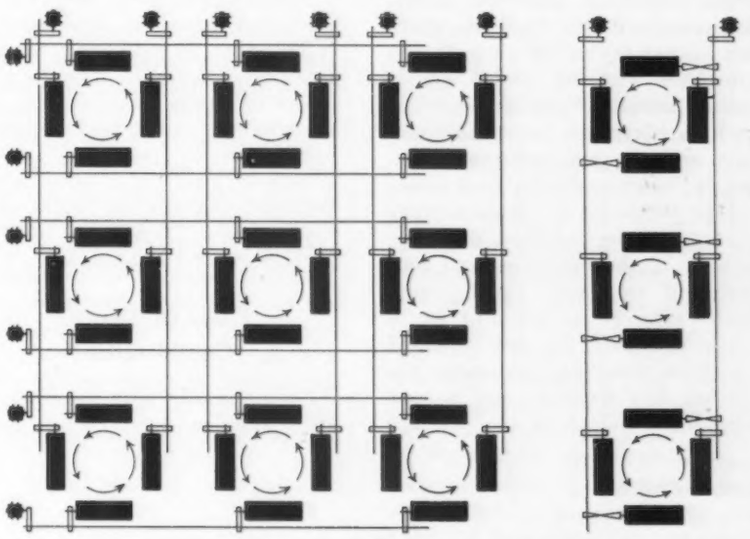


FIG. 3—Illustrating the factor of motion economy in the planning of transmission drives.

At times, such "units" of production will be single machines. More frequently, however, such units will be definite groups of machines doing similar work, or work definitely related in sequence. For example, a stamping machine which forms the fenders of an automobile must be considered a single production unit, and the problem of driving that machine is the problem of most economically getting power to it alone. But the machining and finishing of a casting may require successive steps of work on four machines which may logically be set up around a single worker whose principal functions are to place the work on the machines successively and to see that the machines perform properly. In this case, all four machines together are a production unit, and generally the conditions of operation permit of their being regarded likewise as a unit from the standpoint of transmission drive. When such "grouping" of machines can be made, it is essential that the transmission system driving them be not larger than the logical production unit, to take advantage not only of the load factor of operation, but also of the factor of flexibility of operating time. Thus that particular transmission system will operate only when the production unit of machines is in use, and while operating it will be fully loaded and working at its highest efficiency. Fig. 2 illustrates two methods of operation of a four-line production set-up. In the first method the drives run across the flow of production, and cannot therefore operate efficiently except when all the lines are working simultaneously. The second method makes the drives coincide with the flow of production, permitting each line to operate at its highest efficiency. The placement of machines in each line need not be in parallel lines; they may be grouped

around a single attendant without altering this principle. This is indicated in Fig. 3 in two ways: the left-hand chart shows 36 machines driven by 12 motors using cross shafts and open belts only, the right-hand chart shows 12 machines driven by two motors with parallel shafts and alternate quarter-turn belts. Wherever such setups are possible, the group system gives maximum motion economy at a minimum power operating cost in full consonance with the best advantages of a planned production flow and with lowest material handling cost.

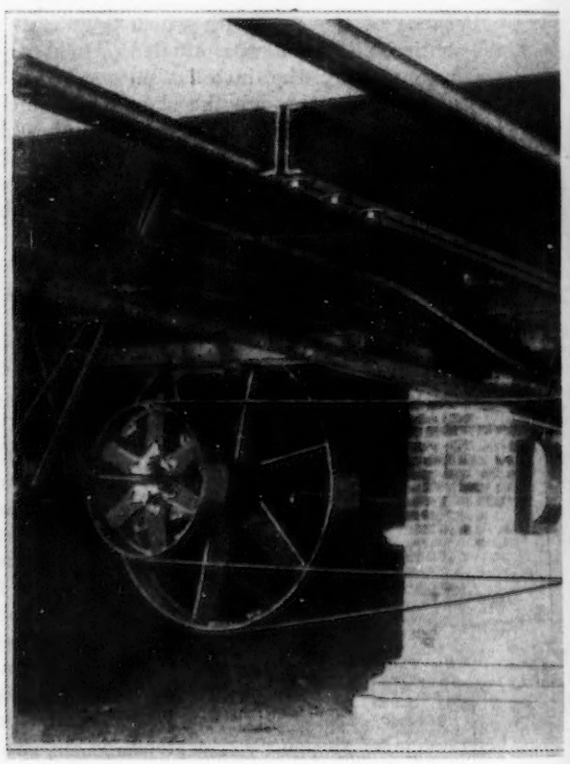
While the validity of these principles has been admitted almost universally, it has often been maintained that the use of group drives interferes with the proper use of certain materials handling systems, such as conveyors, overhead tramrail systems, and electric trucks. But in the properly designed group system this is not so. Modern group drives may be installed under or in back of the machines, and concealed if required. Small, short shafts may be so installed as to make provision for any type of materials handling equipment operation. Any condition may be met when the solution of the problem is planned with all the factors in mind. Even the question of providing for machine mobility (or the relocation of machines, or replacement of present machines with others of different operating characteristics, to provide for changes in the work going through the shop) does not alter the consideration of group drive principles. The modern rectangular system of stringer construction with the lateral members and the hangers both movable, provides a very high degree of flexibility in machine location or relocation. A complete description of this system, together with a detailed discussion of its advantages and limitations, will be presented later. At this point it is sufficient to note that machine mobility is in accord with the principles of group drive design, and permits the undoubted economic advantages of that system to be employed even in a shop where frequent changes of work make the question of machine mobility an important consideration.

Power Distribution Considerations

Coincidentally with the analyses of production flow, motion economy and materials handling (and only coincidentally therewith) comes the real problem of power transmission—the problem of taking power from a source and distributing it to its several points of use with the least possible loss, and with the lowest possible investment cost in equipment to transmit that power. That problem is essentially one of utilizing most efficiently the load factors of the machines to be driven.

The trend toward individual motorization of every machine in recent years has resulted, in innumerable cases, in the installation of a great deal of excess motor horsepower in the plant. Where machines are individually motorized the sizes of motors provided must be those which will accommodate in each case the starting load of the machine, or the peak load of operation, whichever may be the largest. But for the great majority of the machines of industry the normal running load of any machine is about one-half the starting or peak load. Hence, individual motorization frequently means 100 per cent overmotoring of the true plant load. The group drive system utilizes the principle of combining the operations of sim-

FIG. 5—Often all overhead construction can be eliminated in a group drive system by installing the



ilar or related machines in such a way that the installed horsepower of the motors totals only the sum (or in some cases slightly more than the sum) of the *normal running loads* of the machines driven. Thus, installed motor horsepower is materially cut down, and the motors in operation work at high efficiency since they run at practically full load continuously. The saving in fixed charges on the lesser amount of installed motor horsepower, plus the saving in power used in operation, plus the saving in maintenance costs on a smaller amount of drive equipment, taken together comes to an appreciable cost advantage in favor of the group drive system, *where that system can be used.*

To determine where it can be used, or in other words, to determine the number of machines which can most effectively be operated from one motor (and this is the key to the solution of the economic power transmission problem), it is necessary to make studies of machine operating loads and times. This may be done for any number of machines in a department or in an entire plant by noting at frequent intervals regularly spaced throughout a typical production day the sustained peak loads on each machine, and the times of operation in case they are not operated continuously. The value of the sustained peak loads of any machine may be taken as the rating of the motor required to operate it with individual motor drive. Plotting these notations graphically for each machine enables the investigator to determine which machines must be individually motored because of load factors which do not fit in with other machines, because of odd operating periods, or because of any other feature of "individuality" which especially marks out those machines from the others in the shop. Likewise, the graph will indicate which machines may be logically combined, from the power standpoint, into groups.

At this point one other production factor should be given careful consideration. Most machines have an economic speed, at which maximum production results. Yet most machines develop a varying load, due to the characteristics of the work performed. In applying an individual motor drive to such a machine, the motor is mechanically connected to the machine to deliver a given maximum machine speed at normal load. As that load increases the motor speed will decrease, and vice versa. The net result will generally be that the *average* machine speed, and hence the production from the machine, will be below the maximum, or economic speed of operation.

Analysis of the grouping of several such machines, operated from one motor, will generally show that the varying loads of these machines will occur at different time intervals, thus offsetting each other, and resulting in the average load of the group being practically constant. Since the load is practically constant, the group drive motor speed is also constant, and can be arranged to maintain continuously the maximum machine speed and hence the most economic production.

In many industries, speed variation reduces the quality as well as the quantity of the product. Since, with modern equipment properly maintained, the varying load on the motor is the only cause of this uneconomic speed variation, a means which automatically eliminates its effects must be considered as an improvement over individual motor drive. In Fig. 4 the effects of varying machine loads on machine speed and production are graphically pictured for both unit drive and group drive, showing that where group drive can be employed it maintains maximum production both in quality and quantity.

Such analyses of power use, operating time and machine speeds, combined with studies of production flow, motion economy and materials handling, make up the investigational data necessary for the complete determination of a transmission system. On the basis of such data, costs may be estimated for various plans, with due regard for the economic principles involved. Frequently the interrelation of the various factors mentioned will make a compromise between several good plans desirable. The best possible power transmission system may make impracticable an improved way of handling materials at lower cost. Or, the ideal set-up may require an installation cost with fixed charges greater than the savings the set-up will produce. Low final production cost must ever be held as the true touch-stone by which

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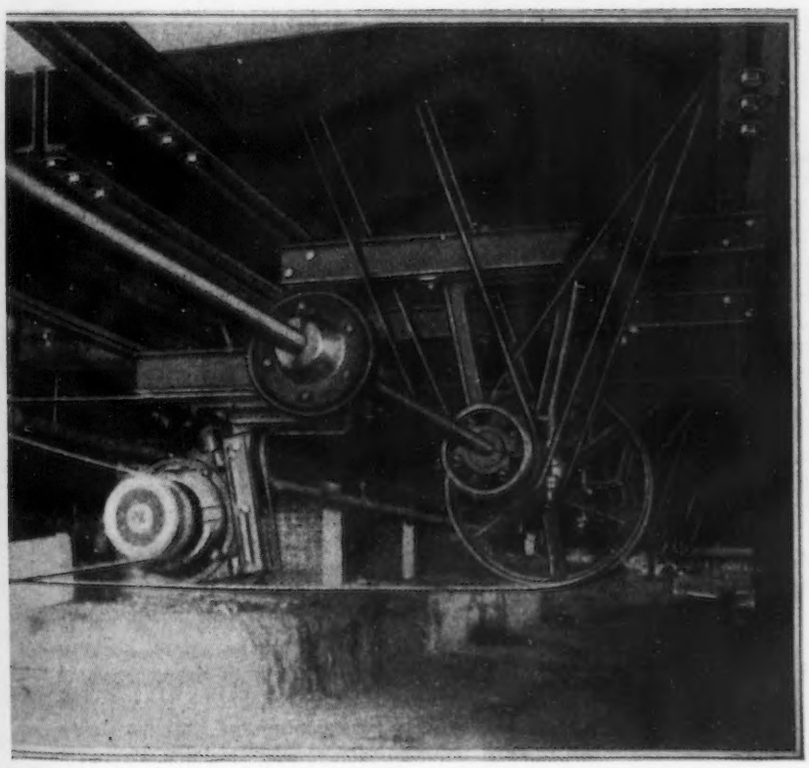
shafting beneath the floor.



CONCEALED CORROSION of INSULATED METAL PANELS

By HUGH G. BERSIE
Engineer, Haskelite Mfg. Corp., Chicago

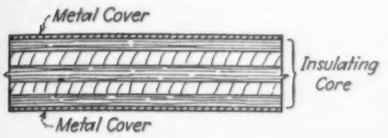
IN industrial air-conditioning rigid insulation boards are oftentimes covered on one or both sides with sheet metal and employed for the walls and ceilings of air-conditioned spaces or rooms. As a practical consideration the steel faces are often cemented tightly to an insulating core. The question naturally arises as to whether or not this cement accelerates corrosion or inhibits it. It is now known that certain types of cements are alkaline and hygroscopic, and that they do increase corrosion. On the other hand, there are other types which are neutral, non-hygroscopic and rust inhibitive. Furthermore, there are simple field tests to determine which of the two types of cements were employed in any particular lot of panels.

In many cases of industrial air-conditioning control of humidity is regarded as of great or greater importance than the regulation of temperature alone. Therefore the problem in building the housing or room is not that alone of heat insulation but there is the additional requirement that the panels stop the passage of water vapor which is a highly penetrative gas and not a vapor in the usual sense of the word. In other words, there is required an insulated gas-tight panel for the walls of the room.

Practical experience has shown serious difficulties in controlling the humidity in a room which is not made with vapor-tight panels. In one case the vapor pressure difference between the inside of the room and the outside was found to be over 1.8 in. of mercury, this being equivalent to 2 ft. on the water gage. This amount of pressure was driving water vapor, a highly penetrative gas, through the walls of the room and it was not surprising, therefore, to find that during a 24-hr. period, this difference in pressure was driving over 22 lb. of water vapor through each 1000 sq. ft. of ⅛ in. fiber board. When such fiber boards were well painted, it was found that the vapor transmission was cut down slightly. The amount of water vapor transmitted was astounding, especially in view of the fact that these fiber boards when immersed absorbed but very little water. Such a board might therefore be likened to a metal wire screen, which of course will allow water to pass through it readily but will not absorb it.

Leakage of water vapor through the walls of a room may to some extent be offset by the installation of air-conditioning equipment that is oversize. There is another feature, however, which works against a panel that is not sealed against water vapor. The water vapor in passing through the protective face travels into the insulating core material which is usually of low density. There this water vapor ceases to be a gas, because it condenses out on the cooler side of the wall. For this reason, the moisture content of the insulating core soon reaches a point where its

insulating value falls off to a marked degree. In contrast to the above is the wall made of metal sheets with the low density core sandwiched in between these sheets. In this case, the core is sufficiently guarded against water and water vapor, and in addition, the flow of water vapor through the walls is totally eliminated. Control of humidity and temperature, therefore, becomes a relatively simple matter.



or migration of moisture from one side of the core to the other. This results in the congregation of the moisture of the core against the inner side of the cooler steel face. Very naturally this concentration of moisture will lead to severe corrosion unless preventative measures are taken in the manufacture of the panel. Some of these measures are: zinc coating of the steel; application of paint or porcelain enamel; and, use of a bonding cement which is neutral and non-hygroscopic.

Galvanizing steel is a common method of guarding against corrosion in air ducts. In addition, copper is alloyed with the steel to give additional resistance to corrosion. The use of paint or enamel as means of preventing corrosion is too prevalent to require comment. In all duct applications, there is the problem of moist air in contact with the metal surfaces. But with the insulated metal panel we have one side of the metal in contact not with air but with a solid (core) which is likely to be wet because of moisture migration described above. Where moisture is present as in this case, corrosion will be very rapid if the glue is moderately alkaline or acidic. Cor-

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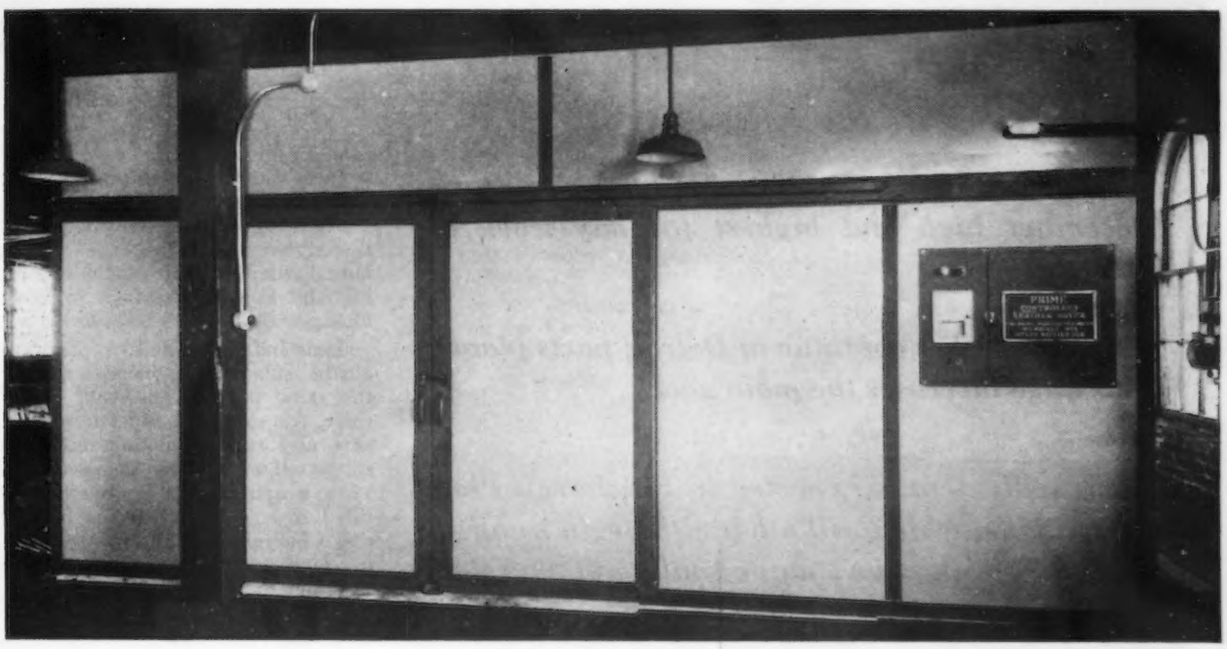


UPPER LEFT

Metal covered panels usually consist of sheet metal glued to an insulating core.

o o o

ABOVE

In many industrial applications of air conditioning humidity control is of greater importance than temperature control.

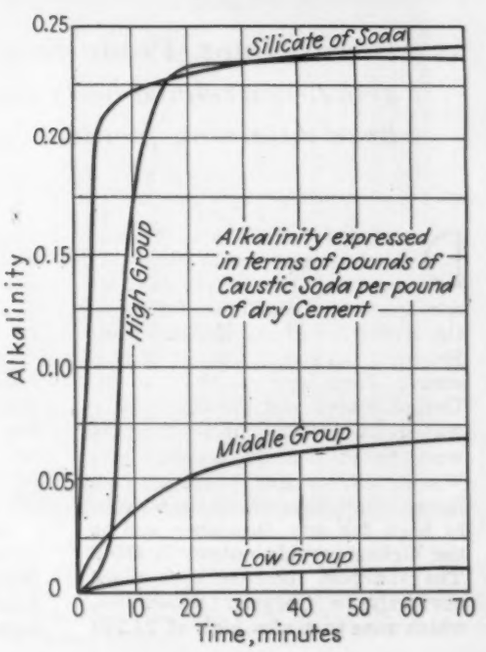
o o o

AT RIGHT

These curves illustrate the difference in alkalinity between various types of cement.

All the above is not new, but it is well to review the importance of taking into account the vapor pressure differences between the two sides of a wall as well as the temperature differences. Too often in the past, the temperature differences alone have been considered.

When an insulated panel of the metal covered type is manufactured, the core or center is dried to a low moisture content and the edges are hermetically sealed. It is impossible to obtain a bone-dry condition, so that when panels of this type are shipped, the moisture content of the core be in the neighborhood of 3 or 4 per cent. In normal service, the two faces or sides of this panel are exposed to a difference in temperature and as a natural result there is movement



THIS WEEK ON THE ASSEMBLY LINE

. . . Weekly automotive output establishes all-time December high and highest for any week of 1936.

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. . . Sporadic strikes continue in Detroit parts plants, with wage increases the main goal.

o o o

. . . Early settlement is expected in Pittsburgh Plate Glass strike, which will otherwise begin to affect Chrysler production; automobile and flat glass workers set up joint council.

o o o

. . . Briggs-Motor Products merger will bring together two related body and parts companies that have adjoining plants.

DETROIT, Dec. 15. — Production jumped up sharply last week as Chrysler resumed assembly line operations following the settlement of the Midland Steel Products Co. strike. Output of passenger cars and trucks in the United States and Canada is estimated at 119,660 units for the week ended Dec. 12, according to Ward's Automotive Reports. This figure establishes an all-time weekly high for any December and is the highest weekly output in 1936. The sharpest increase took place obviously in Chrysler assemblies, which rose to a new high of 24,550 from an estimated 7750 units the week before. General Motors showed only a slight gain to 53,450 from 52,900 for the week ended Dec. 5. Ford's output was reestablished at 25,700. Barring labor difficulties, December production should be somewhere between the volume established in April and May of this year at the time of the spring peak, or close to 500,000 units.

Sales continue to break records, although Polk's earlier estimate of November registrations of 225,000 units has been dropped to 200,000 units. Whereas orders were extremely high in November, deliveries were rather slow, so that the backlog of unfilled orders continued to rise during the month. Many companies are now reporting the largest backlogs in their history.

Some individual sales reports indicate substantial increases over the same period last year. Chevrolet, for example, reports 108,093 cars and trucks sold at retail, as compared with 92,065 in November, 1935, a gain of 17.4 per cent. Unfilled orders are close to 100,000 and Chevrolet is currently producing 6000 cars a day. Studebaker's November deliveries totaled 8944, a 66 per cent increase over the 5383 cars and trucks sold in November, 1935. Hudson reports sales of 8300 units in November, a gain of 30 per cent over the same period in 1935 and the December volume seems to be growing. Pontiac sold 17,455 units in November, as compared with 14,148 a year ago. November production was 21,538 units and December's volume is set at 26,000. Pontiac is currently producing 1100 units a day. Buick's production budget for December is 28,000. Oldsmobile has scheduled 25,000 units for December, roughly a 40 per cent increase over the 18,000 units produced in 1935.

Production of member plants of the Automobile Manufacturers' Association totals 337,446 units in November, as compared with 300,388 a year ago, representing a gain of 12 per cent and a 55 per cent increase over the preceding month. Total production to date is placed at 3,119,865 units, a 23 per cent increase over the same period last

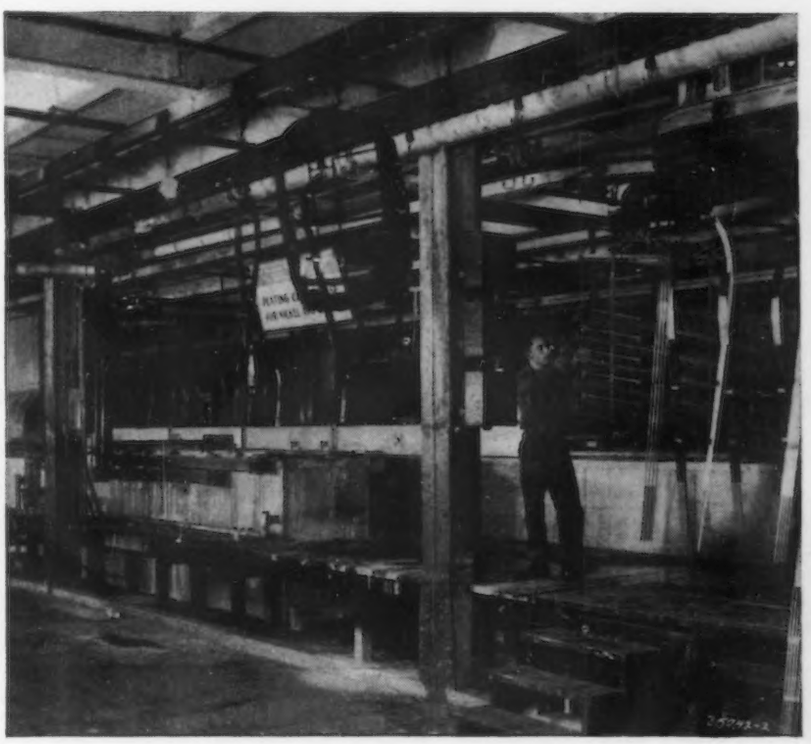
year. Total production of General Motors units in the United States and Canada for November totaled 191,720 units, a 5 per cent increase over the November, 1935, volume, although a 13.7 per cent increase was registered in retail sales in the United States.

Labor Situation

A series of sporadic sit-down strikes has followed the settlement of the Midland Steel Products Co. affair a week ago. Bohn Aluminum & Brass Co., suppliers of non-ferrous castings and extruded shapes to the industry, had a brief sit-down strike which was settled by wage increases. Kelsey-Hayes Wheel Co. dismissed all of its workers Thursday afternoon because of a small sit-down affair in the Ford wheel department, but managed to get the plant operating by Friday morning during the course of negotiations with officers of the United Automobile Workers, who are involved in this situation as in so many others in the past few weeks. Initial settlement included the establishment of a minimum hourly wage rate of 75c., meaning an increase of 17 per cent for some workers. As this report goes to press, negotiations are being continued to increase wage rates all along the line and to establish an 8-hr. day. A significant factor in this situation is the establishment of the 75c. an hr. minimum, equal to Ford's present standard rate and 5c. an hr. more than the minimum established in the settlement of the Midland frame plant strike. In other words, in the course of a week the UAW had raised the ante by a nickel and has apparently got away with it. If the trend should continue at the present rate, demands for $1 an hr. minimum will soon be heard.

A second sit-down strike was called at the Kelsey, Hayes Wheel plant at noon Monday upon rejection of the demand of the union that it be recognized as the sole bargaining agency for the plant with additional increase in pay.

Meanwhile the Aluminum Co. of America's Detroit foundry and extrusion plant is tied up with a sit-down strike involving nearly 1000 workers. The local manager has refused to deal with the UAW



GENERAL view of Pontiac's new chrome plating department showing dipping tanks, conveyors with operator loading radiator side grilles. Capacity is for 70 cars per hour. Each complete grille has eight side grilles, two hood side grilles, one hood center grille and one radiator center grille. All parts are copper and nickel plated before they receive the chrome plating.

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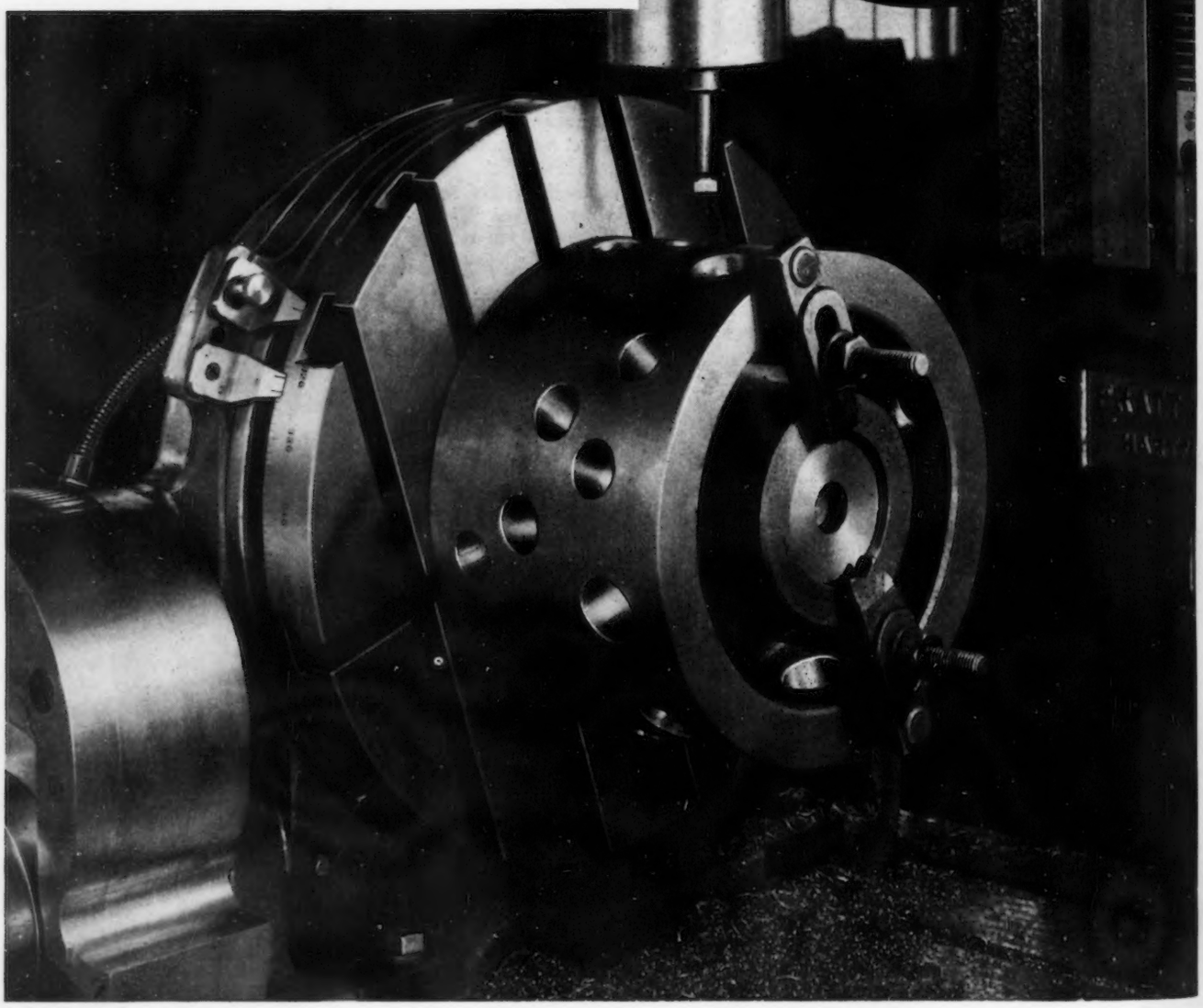

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officials, although this international union has taken upon itself the job of feeding those workers sitting in the plant. It is very probable that they will have them all signed up as members before the end of this week. Taking in members at no dues during a strike, however, is no criterion of how many will be retained as dues-paying members after the affair is over. The indications are, however, that as the UAW gains concessions in the parts plants it is also gaining ground in total membership and prestige among the working population of the city. It seems likely that Detroit will be in for this sort of thing for some time to come, with gradual concessions here and there, unless some serious tie-up should bring the matter to a sudden, decisive crisis.

The trend right now is for organized labor to force increased wage rates, shorter hours, the paying of over-time after a fixed amount of hours and the complete abandonment of piece rates. The principal manufacturers abolished piece rates several years ago, largely it was considered at the time, to appease the growing demand from labor as yet unexpressed by unified action. Now, part of the UAW strategy is to force this movement down into the parts plants and present indications are that they will very likely succeed in doing this. The establishment of a 40-hr. week seems to be definitely on the way and so far it has been established voluntarily by the large manufacturers, although the UAW is obviously taking credit for steps in this direction owing to the fact of its mere existence as a threat to the industry. General Motors went over to the 40-hr. week with time and a half for over-time the first of the month and Chrysler did likewise, neither company with any publicity attending the event. Rumors going around Detroit at present are to the effect that the Ford Motor Co. is considering the adoption of a 6-hr. day, 6 days a week and involving four shifts, which would make a 36-hr. week. Increases in the minimum day rate would probably accompany such a move, but would undoubtedly upset the present labor market, already in the throes of drastic change.

The time and a half for overtime will increase workers' earnings at times of peak load, but the general idea is to serve as a brake on individual plant managers and make them hit the 40-hr. week as closely as possible, with the ultimate aim of stabilizing employment by extending the work year for more persons on the payroll, a very laudable objective. The manufacturers appear to be living up to the spirit of the defunct NRA and even going past it. As far as wages are concerned, the manufacturers are tending toward an increase of annual income rather than an increase in hourly rates. This may appear to be in conflict with some of the other trends noted, but is compensated for by an extension of work hours over a longer period for a larger number of employees. For parts plants, hourly rates are going up fast, tending to bring them more nearly in line with those of the corporation shops.

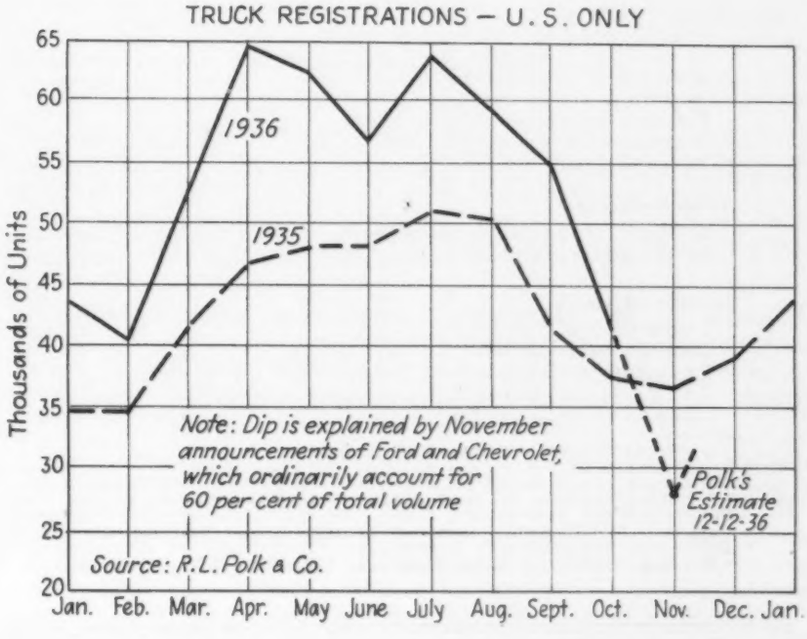
The Pittsburgh Plate Glass strike, now in its eighth week, continues to be a serious threat to the automotive industry. A shortage of glass has yet to be felt, but unless a settlement comes quickly, there is bound to be an adverse effect on Chrysler production. The Pittsburgh settlement, if it comes about, is particularly important because it will undoubtedly affect the renewal of the contract that Libbey-Owens-Ford has with its flat glass workers' union. The old contract expires today. For several weeks the Pittsburgh management would not meet with the representatives of the union, but negotiations were resumed last week. It is reliably reported that the union has now agreed to table the demand for a closed shop and the check-off, which was the chief stumbling block in the negotiations. It is probable that the company will agree to all other demands, however, which include a 10 per cent wage advance.

There is another significant factor to be found in the plate glass labor situation. Last week Homer Martin, president of the UAW, met in Toledo with Glen McCabe, president of the Federation of Flat Glass Workers, and arrangements were made for the setting up of a joint council which "shall have authority to order such joint action as it may deem necessary to cope with any labor situation that may confront either organization." Already the two groups are sponsored by Lewis' CIO, which had a hand in the settlement of the Midland Steel strike and which has been directing the United Rubber Workers of Akron. The tie-up of steel, glass, rubber and automobiles is being effected quite rapidly. The keynote to the whole situation is found in the workers' song "Solidarity," which was heard from the lips of the strikers as they left the Midland Steel plant just prior to the final settlement. Incidentally, this affair was considered, by organized labor in Detroit, to be the greatest victory in years and was celebrated by a suitable Victory Ball last Saturday night. Actually the week's sit-down produced an increase of 4c. an hr. in the minimum rate for machinists over what the company had already agreed to in earlier negotiations with the union prior to the sit-down strike.

Briggs Merger

Negotiations were completed last week for the merger of the Briggs Mfg. Co., largest independent body plant, and the Motor Products Corp., which is separated from it only by a fence. The basis of the merger will be an exchange of two shares of Briggs stock for each three shares of Motor Products stock and will make a $50,000,000

(CONTINUED ON PAGE 69)



Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	November, 1936	October, 1936	November, 1935	Eleven Months, 1935	Eleven Months, 1936
Raw Materials:					
Lake ore consumption (gross tons)[a]	.....	4,384,809	3,025,694	27,760,943	.....
Coke production (net tons)[b]	.....	4,307,849	3,217,175	31,720,422	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	‡2,947,365	2,991,887	2,065,913	18,901,349	‡27,503,760
Pig iron output—daily (gross tons)[c]	‡98,246	96,512	68,864	56,591	‡82,101
Castings:					
Malleable castings—production (net tons)[d]	.....	51,778	44,277	420,797	.....
Malleable castings—orders (net tons)[d]	.....	55,521	47,778	410,038	.....
Steel castings—production (net tons)[d]	.....	74,775	36,165	361,195	.....
Steel castings—orders (net tons)[d]	.....	59,431	32,714	359,618	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	4,337,412	4,545,001	3,150,409	30,344,580	42,487,717
Steel ingot production—daily (gross tons)[e]	173,496	168,333	121,170	106,100	148,558
Steel ingot production—per cent of capacity[e]	79.05	76.70	54.73	47.93	67.69
Finished Steel:					
Trackwork shipments (net tons)[e]	4,756	5,547	3,090	39,204	63,234
Steel rail orders (gross tons)[e]	123,875	119,237	81,721	445,020	927,940
Sheet steel sales (net tons)[f]	.....	223,195	289,101	2,270,171	.....
Sheet steel production (net tons)[f]	.....	235,057	224,541	2,216,216	.....
Fabricated shape orders (net tons)[g]	.....	127,303	91,693	972,368	.....
Fabricated shape shipments (net tons)[g]	.....	152,999	94,746	1,019,002	.....
Fabricated plate orders (net tons)[d]	.....	33,791	19,116	222,731	.....
Reinforcing bar awards (net tons)[e]	18,740	22,135	11,475	289,315	316,240
U. S. Steel Corpn. shipments (tons)[h]	882,643	1,007,417	681,820	6,709,784	9,757,767
Ohio River steel shipments (net tons)[i]	.....	145,065	88,338	864,508	.....
Fabricated Products:					
Automobile production, U. S. and Canada[k]	.....	229,989	411,535	3,760,912	.....
Construction contracts, 37 Eastern States[l]	$208,204,200	$225,839,900	$188,115,000	$1,580,408,400	$2,475,600,300
Steel barrel shipments (number)[d]	.....	924,797	634,396	6,331,077	.....
Steel furniture shipments (dollars)[d]	.....	$1,776,784	$1,591,286	$13,965,584	.....
Steel boiler orders (sq. ft.)[d]	.....	968,473	464,431	5,560,423	.....
Locomotive orders (number)[m]	.....	22	0	28	.....
Freight car orders (number)[m]	.....	1,310	25	8,128	.....
Machine tool index[n]	147.1	136.5	98.6	†93.8	†134.0
Foundry equipment index[o]	.....	174.4	100.4	†122.9	.....
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	.....	56,637	45,461	.....
Imports of pig iron (gross tons)[p]	.....	.....	15,550	114,648	.....
Imports of all rolled steel (gross tons)[p]	.....	.....	17,089	193,851	.....
Total iron and steel exports (gross tons)[p]	.....	.....	205,242	2,828,067	.....
Exports of all rolled steel (gross tons)[p]	.....	.....	88,008	812,159	.....
Exports of finished steel (gross tons)[p]	.....	.....	68,324	688,831	.....
Exports of scrap (gross tons)[p]	.....	.....	104,961	1,902,429	.....
British Production:					
British pig iron production (gross tons)[r]	643,100	670,300	525,100	5,862,700	7,010,200
British steel ingot production (gross tons)[r]	1,001,300	1,060,500	903,300	9,030,900	10,679,800
Non-Ferrous Metals:					
Lead production (net tons)[s]	.....	42,156	40,369	379,744	.....
Lead shipments (net tons)[s]	.....	59,210	43,035	391,123	.....
Zinc production (net tons)[t]	45,742	46,297	37,469	390,949	477,221
Zinc shipments (net tons)[t]	57,107	54,035	48,172	423,658	593,452
Deliveries of tin (gross tons)[v]	5,345	6,005	4,035	53,750	77,075

†Three months' average. ‡Official figures.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] The Iron Age; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of Census; [l] F. W. Dodge Corp.; [m] *Railway Age*; [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.

Weekly Index of Rate Activity in Capital Goods, Adjusted for Seasonal Variation, 1925-27 Average = 100

THE IRON AGE Weekly Index Numbers of Capital Goods Activity

(1925-27 Average = 100)

Last week	97.5	Same week 1933	53.7
Preceding week	92.5	Same week 1932	40.1
Same week last month	88.6	Same week 1931	52.0
Same week 1935	77.2	Same week 1930	74.4
Same week 1934	50.8	Same week 1929	99.2

CONTINUED post-seasonal activity in the heavy industries lifted THE IRON AGE's business index into new high ground last week. The index mounted 5 points to 97.5 per cent of the 1925-27 average or "normal," as compared with a figure of 92.5 for the preceding period. The 5-point increase represented a percentage gain of 5.4. Relative to the corresponding week in 1935, it was an increase of 26.3 per cent. Compared with the same week for 1934, the index rose 91.9 per cent. Likewise it was 143.1 per cent higher than in 1932, and only 1.7 per cent lower than in 1929.

Conspicuous changes for the week in the separate indices of the combined barometer of activity included a substantial contra-seasonal rise in steel ingot production, a large gain in the automotive series and advances in heavy construction and Pittsburgh district activity.

By rising to 97.5 last week, the combined index, of course, set a new peak for the year and was at a level higher than for any intervening period since the last week in June 1930. It is not likely that the index will lose much ground, if any, over the remaining two weeks this year, and accordingly should exceed year-end 1929 activity. The index rapidly dropped off during December 1929, reaching a low in the final week of 80.4 per cent of average.

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Cram's Reports, Inc.; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

Per Capita Output Still Under 1929

WHILE actual output in various manufacturing industries has reached or even surpassed the 1929 level, per capita production in general is still approximately 19 per cent below that of 1929, according to a study just completed by the National Industrial Conference Board.

To provide the same amount of goods per capita today as was made in 1929, total output must be greater than in that year, because of the growth in population.

Only four of the 18 industries studied in this survey showed a greater per capita production in the first nine months of 1936 than in the same period of 1929. These are: Plate glass industry, which stands at 130.8 per cent of the 1929 level; tobacco products industry, 106.2 per cent; boot and shoe industry, 106.1 per cent; and the petroleum refining industry, 100.4 per cent.

Per capita output in the automobile industry this year was 78 per cent of the 1929 volume, while other industries in which the per capita output ranged from 75 to 80 per cent are rubber tires and tubes, iron and steel, zinc, coke and tin.

WASHINGTON. . . . . .

o o o

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

o o o

. . . Price policies that make for rigidity in quotations not unlawful if not arrived at by agreement, says Assistant Attorney General of United States.

o o o

. . . Further Government regulation of business under a new NRA proposed in new legislation to be drafted by Major Berry's Council for Industrial Progress.

o o o

. . . War Department proposes bill that would mobilize all industry, fix prices and maximum salaries in time of war.

WASHINGTON, Dec. 15.—An outstanding, if not the chief, contribution at the meeting of the Council for Industrial Progress last Thursday was an ably prepared address by John Dickinson, Assistant Attorney General of the United States. Given scant space in the press, owing probably to developments of history-making world events, Mr. Dickinson's speech dealt with "The Enforcement of the Anti-trust Laws," of which he has charge. The anti-trust laws and their bearings on a national industrial policy share in the problems of the council.

Mr. Dickinson set forth clearly the application and limitation of such laws. He did so after pointing out that "much is frequently demanded of the anti-trust laws by certain sectors of public opinion which the laws themselves as written by Congress and construed by the courts do not supply, and on the other hand there is a widespread belief that other things are exempted from the operation of the laws which in fact are not exempted as the laws now stand and as they have been authoritatively construed. He told the council that "either the machinery for enforcement of the anti-trust laws must be expanded, or some other and different machinery for accomplishment of the purposes of those laws must be devised."

As the anti-trust laws have been construed by the courts, Mr. Dickinson said, the mere size of a concern and the proportion of the market it supplies do not of themselves constitute a violation of the law. It must also be understood, he pointed out, that *the anti-trust laws do not outlaw business practices and price policies merely because such policies may operate to make prices relatively rigid or to discourage price wars and market breaks.* (The italics are ours.)

As the anti-trust laws now stand, Mr. Dickinson stated, there is nothing which makes price rigidity unlawful or which outlaws practices that result in price rigidity, unless such practices happen to be the consequence of definite concert or agreement which was said to be unlawful because it violates the prohibitions of the anti-trust laws against concert and agreement of certain kinds.

Moreover, Mr. Dickinson said that the prohibition of the anti-trust laws applies to the action of employees seeking to better their condition no less than to the action of business concerns. Since possible economic justification creates no exemption from the operation of the law as construed by the courts in this field, it was pointed out, it frequently results that clear violations of the anti-trust arise in the field of labor disputes "where our economic and social sympathies are strongly enlisted on the side of those charged with the violation."

Mr. Dickinson said that as a general thing it is not unlawful for large concerns in the ordinary course of business, and as participants in the competitive struggle, to engage in competitive practices on the same terms as their smaller rivals so long as their conduct is simply directed toward the pursuit of their legitimate business advantage and not directly aimed at the suppression or destruction of competition in an illegitimate manner.

Large Concerns Have Same Rights as Small Ones

"In other words," said Mr. Dickinson, "as the anti-trust laws stand, they do not make mere bigness unlawful, nor do they in general place upon the large business concern, because it is large, any special limitations in the competitive struggle which are not placed upon the smaller concerns also. To this statement there are of course certain possible exceptions which readily come to mind, as, for example, in connection with contemplated mergers. But in the main it is true to say that if there are those who believe as a matter of policy that bigness in business should be shackled and subjected to special disadvantage, they cannot hope to see their objective in many of its aspects accomplished merely by the enforcement of the anti-trust laws, but must seek for new legislation at the hands of Congress by convincing that body that sound legislative policy requires the adoption of their views."

It was pointed out that there has been much discussion in recent years of the problem of so-called

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rigid prices. One of the most valuable by-products of the great depression, Mr. Dickinson said, has been the stimulus it has given to a better and more thorough understanding of the workings of our present economic system. As that understanding has been achieved, it was explained, students and analysts have pointed out that in many of our industries prices have a tendency to remain relatively stable over long periods of time while in other lines of business they fluctuate more or less violently.

Mr. Dickinson declared that where price policies and business practices which may happen to promote price rigidity are not the result of unlawful concert or agreement, but have merely grown up in an industry owing to the conditions of the competitive struggle existing in that field, there is no prospect of a successful prosecution, because the courts do not construe the anti-trust laws to outlaw such practices. Once again, therefore, he said, if there are those who believe that price rigidity and the practices which promote it are contrary to public policy, they must appeal to Congress for legislative action rather than to the Department of Justice for anti-trust proceedings.

"In view of the definiteness of the legal prohibition against agreements affecting competition," Mr. Dickinson declared, "business men appear to have learned their lesson well, and few such agreements are today made candidly and openly."

Just as price rigidities furnish no ground for illegality, if not the result of deliberate concert, the same is true of price unformities, Mr. Dickinson pointed out. Accordingly, it was stated, if the concert which underlies price rigidities and price uniformities is secret and concealed with care, it is often extremely difficult to distinguish the resulting situation from one which may be perfectly legal. He told of the elaborate and painstaking kind of investigating work that is required to handle the many cases presented to the department and said that while the Department of Justice during the past year has regularly attached economic consultants to its staff the force is inadequate if the anti-trust laws are to be "even-handedly enforced over the whole business field, with proper emphasis on public importance rather than mere private complaint as the moving force in the initiation of proceedings." He said it would be necessary for such work to increase both the staff of economic analysts and the anti-trust staff.

"If we are not willing to recommend the creation of facilities which are indispensable to the enforcement of the anti-trust laws, there is no alternative but to suggest alteration," sair Mr. Dickinson. "That is substantially the alternative with which we are confronted at the present time."

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New Federal Regulation of Business To Be Proposed by Major Berry

WASHINGTON, Dec. 15.—Back in Washington from his South American trip, President Roosevelt will have placed before him a far-reaching program providing for the reestablishment of an NRA and other legislation. It will be submitted to him by Major George L. Berry, Coordinator for Industry. The proposed legislation will be based on recommendations of the eight committees of the Council for Industrial Progress, following its meeting here last Thursday and Friday.

The outstanding legislation will look to the enactment by Congress of a Fair Trade Act, recommended by the Committee on Fair Competition. So expansive and diverse are some of the recommendations that separate bills will have to be drafted rather than to attempt to include all of the proposals in an omnibus bill. And, if the legislation is enacted, the vast Federal bureaucracy, already excessively top-heavy, will be greatly enlarged into a system of hard and fast regimentation by the Government which will be greater than that which was attempted by NRA.

That this is so is evidenced by recommendations of the committees, made up equally of business men and representatives of labor, all of the latter being from the ranks of organized labor as is Major Berry himself.

Recommendations of Council

Highlights of the recommendations follow:

Committee on National Industrial Policy: New NRA to control production "under emergency conditions"; to fix minimum wages and maximum hours; to set up fair trade practices; establishment of permanent Advisory Council to study national income, its sources, distribution, uses and forces which cause it to freeze and paralyze industry.

Committee of Fair Trade Practices: Enactment by Congress of model Fair Competition Act. Administrative body to be constituted out of Federal Trade Commission "or otherwise."

Committee on Anti-Trust Laws: Amendments to provide equal opportunity for all competitive enterprise. Optional filing of voluntary trade agreements with designated tribunal to be established. Creation of appellate court to hear appeals from administrative agencies which now go to United States Circuit Court of Appeals.

Committee on Financial Aid to Small Enterprise: Reaffirms previous recommendations for direct Government loans to small enterprise by RFC or some new agency to be set up by legislation.

Committee on Employment and Unemployment: Legislation to national census of em-

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Committee on Internal and External Competition Affecting American Standards: Setting up by the Government of National Economic Research Council to analyze data regarding extent, use and perpetuation of nation's resources; sources, use and means of safeguarding nation's income; interrelated functions of labor, private capital and Government agencies.

Committee on Government Competition with Private Enterprise: Reaffirms former report on evils of Government competition.

Committee on Taxation: Urges Council for Industrial Progress to undertake through this committee study to determine deterrent effect of present taxes upon enterprise and employment with view to recommending such changes as will produce maximum tax revenue with minimum burden on industry and public; would place greatest tax on "least useful" income and tax income rather than sources of income.

NRA for "Little Fellow"

Major Berry said that he will call a meeting this week of a committee of his Council for Industrial Progress to draft the legislation, which he and the council consider to be equivalent to an "NRA for the little fellow." Berry expressed the hope that the proposed legislation can be presented to the President soon and introduced in Congress early in its session. This manifestly is predicated on Presidential approval. Berry said that the President had previously indicated approval of principles sought by the council.

When asked if parts of the legislation did not run counter to Supreme Court decisions, Berry said an attempt will be made to frame the program within constitutional limits. But, he added, if that cannot be done, the council will discuss possible amendments. He said the council probably will meet in January to pass upon the completed program.

Some of the proposals made not only overlap, but there is already Government machinery for their administration, such as that calling for voluntary trade agreements between management and labor. The program by adding to Government control is looked upon as extending to a point where it will become so overpowering as to fall of its own weight. Many of the proposals are simply restatements of recommendations formerly made by the committees.

Major Industries Absent

The council meeting had an attendance of some 900, some of them simply "observers." It was made up of representatives of small business lines principally. The absence of representatives of major industries such as steel, automotive, metalworking, rubber and textiles was the source of resentment to Major Berry as indicated by a radio broadcast last Friday night when he offered to resign as coordinator for industrial cooperation if his resignation would bring about cooperation between the New Deal and business. The bustling major's suggestion, however, was not taken seriously. The fact that on the day following his broadcast he announced plans for drafting of legislation was taken as evidence that he proposes to stick to his job, which he enjoys immensely. The major first had a run-in with some of the representatives of the larger industries at the meeting of the council last year when they walked out on him because of the legislative program he then tried to jam down their throats. Frequently, during the Presidential campaign, the major as head of Labor's Non-Partisan League made vigorous attacks on so-called big business. Industrialists also have protested that so-called surveys of different industries by the major have presented distorted pictures, especially as they attempted to show the disparity between wages and earnings.

The proposed general legislation for the setting up of a Fair Trade Act contemplates that as far as possible all regulations of business be effectuated under Federal enactment. Seeing the possibility of conflict with the Constitution, the committee recommendations as to uniform state legislation were urged only to the extent that "state legislation may ultimately be found necessary to supplement Federal legislation."

Many Prohibitions in Proposed Act

The proposed act would prohibit unfair competition "whether in manufacture, production, distribution, sale or advertising of merchandise or services, which is characterized by fraud, deceit, misrepresentation, bad faith or oppression, or which, by reason of the maintenance of unjust or unreasonable wage or hour standards or the employment of child labor, or by reason of merchandising, distributing, or advertising practices, or otherwise, would tend in its results to create monopolies or to be injurious or oppressive, particularly as to small enterprise, or to reduce involuntarily the number of independent competitors willing and able to maintain just and reasonable labor standards and to operate at a reasonable profit." "Loss leader" practice would be prohibited and go beyond the Supreme Court decision of last week upholding the validity of the state fair trade acts

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which covered trade-marked goods only. The proposed legislation would expressly permit resale price maintenance generally, applicable to unbranded as well as branded goods. The proposed administrative body, Federal Trade Commission "or otherwise," would be authorized to approve agreements voluntarily submitted by management and labor in any industry dealing with minimum wages and maximum hours and fair trade practices. The committee suggests adjudication of complaints for violation of the act by a judicial body, preferably an independent industrial court. It would have equity powers, including the power of issuing permanent and temporary injunctions and also power to cite and after hearing give judgment with respect to all members of trade and industry. The court also would have the widest powers to modify or abrogate its judgments on the application of properly qualified parties. Approval of this recommendation by representatives of labor on the committee was conditioned on the court being so constituted as to include a specified number of judges appointed from nominations submitted by representative national organizations of labor.

Automobile Output Census for 1935

WASHINGTON, Dec. 15.—Production of completed motor vehicles and chassis in 1935 totaled 3,922,746 units, valued at $2,152,477,274 compared with 1,848,013, valued at $928,649,967 in 1933, according to preliminary figures compiled from returns of the Biennial Census of Manufactures of the Bureau of the Census. The combined number of wage earners employed last year in the manufacture of motor vehicles and motor vehicle bodies and parts, taken as an average for the year, was 387,725, an increase of 59.2 per cent compared with 243,614 reported for 1933. Passenger cars produced in 1935 totaled 3,212,835, valued at $1,752,794,114 compared with 1,534,366, valued at $753,133,689 produced in 1933. Truck production last year amounted to 505,237 units, valued at $271,206,236 as compared with 213,683, valued at $110,765,361 in 1933.

Would Mobilize All Industry in War

WASHINGTON, Dec. 15.—Industrial management would be drafted into the Government service just as are its soldiers in time of war if recommendations in the War Department report, made public last week, are enacted into legislation. Prices of all commodities would be fixed, and a system of priority for delivery of goods for successful prosecution of war would be established. Commodity exchanges would be regulated and if found desirable all securities and stock exchanges would be closed for the duration of war.

Comprehensive and far-reaching plans for mobilization of the country's resources in men, money and materials manufactured, together with machinery for manufacture, are recommended, with the president, general manager and workmen in industrial plants subjected to the same authority and discipline as the army. The authority, which would be given the President, would fix salaries which he may determine, but in no case would they exceed $10,000 a year and persons drafted would be barred from receiving pay from any source other than the Government under penalty of $10,000 fine or 10 years' imprisonment.

The proposed plan of Government dictatorship in time of war is a revision of the Industrial Mobilization Bill considered by the last Congress, but is even more drastic than that measure.

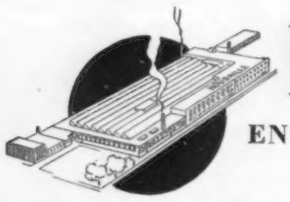
Navy Department To Take Steel Bids

WASHINGTON, Dec. 15.—The Bureau of Supplies and Accounts, Navy Department, has called for bids on Dec. 18 on 3654 tons of steel and on Dec. 22 for 2139 tons. The opening on the former date will cover 764 tons of medium black and galvanized shapes, 699 tons of high tensile galvanized shapes and 366 tons of bar and strip steel for seven destroyers and 1825 tons of plates for stock at the various navy yards. The opening on Dec. 22 will cover 976 tons of steel bars and 1163 tons of sheets for stock. Three of the destroyers are to be built at the Norfolk, Va., yard, two at the Boston and one at the Charleston, S. C., yard.

Bids To Be Taken on Floating Drydock

WASHINGTON, Dec. 15.—The Bureau of Yards and Docks, Navy Department, will take bids Feb. 3 for the construction of a drydock for Pearl Harbor, T. H., to be used for the berthing of 1850-ton destroyers. This is a smaller drydock than the one for which bids were recently rejected by the department because they exceeded the appropriation.

MORE and more during the past few years, Houdaille has been devoting its engineering skill and experience and its highly specialized machining equipment to the production of parts and assemblies for certain nationally known manufacturers. Today Houdaille is in position to offer its facilities to still others—squarely upon the basis of greater precision and lower production costs. The only way you—and we—can determine whether we can do for you what we have done for others is to ask us to talk it over with you.



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Tin Plate Scrap Export Allotments

WASHINGTON, Dec. 15.—Today was the deadline for exporters of tin plate scrap to file requests with the Secretary of State for 1937 exports allotments. Shipments abroad can be made only through licenses granted by the National Munitions Control Board in accordance with the Tin Plate Export Act. Under the procedure announced last week by the Acting Secretary of State allotments will be granted to producers of tin plate scrap and will be assigned on Jan. 1 to producers whose applications have been received within the time limit. Allotments will be based on the individual producer's request with the provision that no allotment of more than 25 long tons shall exceed in amount the quantity of tin plate scrap produced by him during the calendar year 1935. Requests for allotments of 25 tons or less may be granted in full, without reference to the quantity of tin plate scrap produced in 1935, provided the producer presents convincing evidence, in the form of a sworn statement, establishing that he will, during, 1937, produce at least the equivalent of the allotment requested.

No producer will be eligible to receive an allotment until the Secretary of State, who is chairman of the board, has received from him a sworn statement setting forth the quantity of tin plate scrap produced by him in 1935.

In the event that it shall be necessary, in order that the quantity of tin plate scrap to be exported in 1937 shall not exceed the total figure agreed upon by the board, the total will be apportioned on the basis of 1935 production, with the provision that no allotment shall exceed the quantity specified in the individual producer's request. If an apportionment is unnecessary, further allotments will be granted after Jan. 1 in the order of the receipt of requests until the total figure has been exhausted.

Any producer who has received an allotment may, if he so desires, authorize any other person or persons to apply for license to export under his allotment, but it will be necessary that the Department of State be informed promptly of such authorizations.

Vance Iron & Steel Co., Chattanooga, Tenn., has been appointed an Armco ingot iron distributor by American Rolling Mill Co., Middletown, Ohio.

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CORRECT LUBRICATION

Federal Government Taking Interest In the Training of Apprentices

WASHINGTON, Dec. 15.—Growing shortage of skilled labor has stimulated interest in systems of apprentice training. Industries are improving existing plans they have instituted or are putting such plans into effect, according to reports coming to Washington officials. They are also cooperating with the Department of Labor in connection with its Federal Committee on Apprentice Training. Secretary of Labor Perkins pointed out in an address on Nov. 18 before the convention of the American Federation of Labor at Tampa, Fla., that through machinery set by the committee, organized labor groups are in a position to determine the number of apprentices to be trained, and the terms of the apprentice agreement, the purpose being to uphold mechanics' standards of skill and prevent the flooding of the labor market. This procedure, she explained, permits the thorough training of apprentices where needed and under proper safeguards "instead of flooding the labor market with thousands of half-trained workers."

Miss Perkins said that the committee's work is producing practical results and that one national association of employers and one national union have jointly adopted the committee's rules and regulations to govern apprentice training in the industry. These two groups are the National Association of Master Plumbers and the United Association of Journeymen Plumbers and Steamfitters. Several other groups are now conferring to the same end.

In addressing the Council for Industrial Progress in Washington last week, Miss Perkins said that the Federal Government is counting on cooperation from industry and workers in order to make effective its program designed to provide an adequate number of highly trained workers for the demands of the future.

"The apprentice training standards of the Federal Committee will protect apprentices from exploitation which happened too often in the past," she said, "and will protect the trades from overcrowding. No apprentice programs provided through collective bargaining agreements will be disturbed. The public will profit from the program because there will be an adequate supply of journeymen thoroughly skilled in all branches of the trades."

Miss Perkins made a plea to industrialists present that they survey their plants for all jobs suitable to older or unskilled workers and then, wherever possible, fill these places with men from those groups as an initial attack on the growing problem of finding work for men over 40 and heads of families. She pointed out that unless the situation is corrected, made work will have to be provided for these unemployables for which taxes will be needed.

"All too frequently the experience and ability of the older man is passed by in favor of an inexperienced and not properly trained younger worker," Miss Perkins declared. "This is bad for both."

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Walls Will Review Nickel in Cast Iron

THE Northeastern Ohio Chapter of the American Foundrymen's Association, with headquarters in Cleveland, at its Jan. 14 meeting will have representatives of the producers of various alloying elements present to discuss the improved mechanical properties obtainable by the use of alloys in cast iron.

Speaking for nickel, Fred J. Walls will discuss the advantages of the nickel alloyed cast irons and describe some applications in the automotive, machine tool and other industries in which their greater strength and hardness, improved rigidity, pressure tightness and uniformity of grain structure coupled with ready machineability and good castability are essential. Mr. Walls, who is a member of the development and research division, International Nickel Co., has written several papers for the A.F.A., and has been active on committees of the A.F.A., A.S.T.M. and A.S.M.

The meeting will be held at the Cleveland Club, Carnegie Avenue and East 107th Street, Cleveland.

Further Protests on Railroad Surcharges

WASHINGTON, Dec. 15.—Protests against continuance of existing railroad surcharges were made by coal, ore, coke and numerous other shippers at oral arguments before the Interstate Commerce Commission last Friday and Saturday. The arguments were the outgrowth of a petition filed by the carriers. They asked the commission to continue the surcharges for 60 days after the commission passes on the petition of the railroads to readjust the freight rate structure. The latter will be the subject of a hearing to begin Jan. 6. The surcharge rates, unless extended, will expire on Dec. 31. Consequently action by the commission on the petition to extend the surcharges will have to be taken next week or the subsequent and final week of the year.

This Week on the Assembly Line

(CONTINUED FROM PAGE 57)

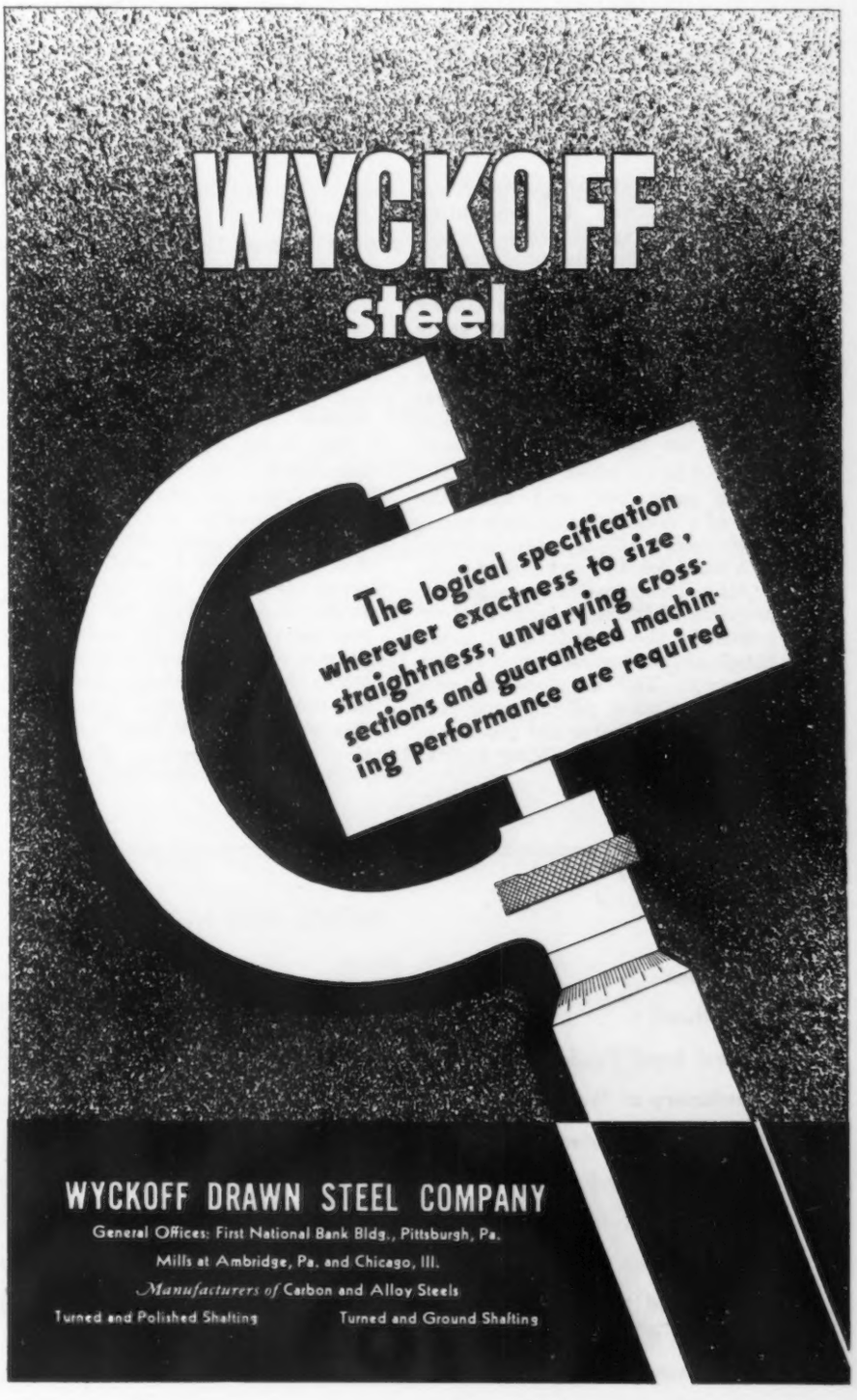
organization, Briggs supplying $42,000,000 of the new capitalization. This move, which has yet to be ratified by the board of directors and stockholders of each company, will bring together two closely related firms. Motor Products makes large quantities of metal body trim, including garnish molding, instrument panels and windshield frames. It has large plating and polishing capacity and provision for grain finishing, besides the manufacture of rolled trimmings. It also has a considerable parcel of real estate east of the plant, which would be available for expansion of the Briggs Mack Avenue plant. Briggs has five other plants in Detroit and one in Evansville, Ind., besides manufacturing facilities in England. Motor Products' only outside plant is at Walkerville, Ontario, just across the river from Detroit. One interpretation of this move is that it will give Briggs control over one of its principal parts suppliers. It does seem that the larger plants are more impregnable against labor attacks than the smaller ones. Motor Products had some labor difficulties last spring, largely because of a jurisdictional squabble between three unions, none of whom dominated the situation. Briggs went through a serious strike three years ago, but its labor relations are now considered of the best.

Ford of Canada

Ford, of Canada, is planning to increase its production capacity by at least 25 per cent and will modernize and consolidate its present manufacturing facilities at Windsor at a cost of $5,000,000. Construction will get under way early in 1937 and the new plant is scheduled to be ready for operation before the end of the year. It will give this plant a capacity of 100,000 units a year.

The program as first announced called for an expenditure of $1,700,000 for an increase in machine shop facilities. An additional $3,300,000 is to go into a body manufacturing plant and final assembly line. A new building is to be erected for this work 1000 ft. long by 570 ft. wide and will house all body manufacturing and assembly activities. Removal of the final assembly line, shipping department and enameling department from the main plant will release some 60.000 sq. ft. of manufacturing space, to which will be added some 73,000 sq. ft. of additional space in an extension. It is in this space that the added machine shop facilities will be placed. This is the largest expansion program undertaken by Ford in Windsor since 1922-23, when the company erected the power house and constructed the main manufacturing plant.

Exports of aluminum ores and manufactures increased in October by 2.1 per cent, while imports rose 37.2 per cent. The $5,708 increase in exports resulted from advances in trade in bauxite and other aluminum ores, ingots, scrap and alloys, and in tubes, moldings, castings and other shaped material. The $187,946 increase in the value of imports reflected the gains in the trade in scrap and alloy aluminum, receipts of which virtually doubled in value, and to a lesser extent, plates, sheets, bars, rods, circles, squares, etc., and in other aluminum manufactures such as foil and powder.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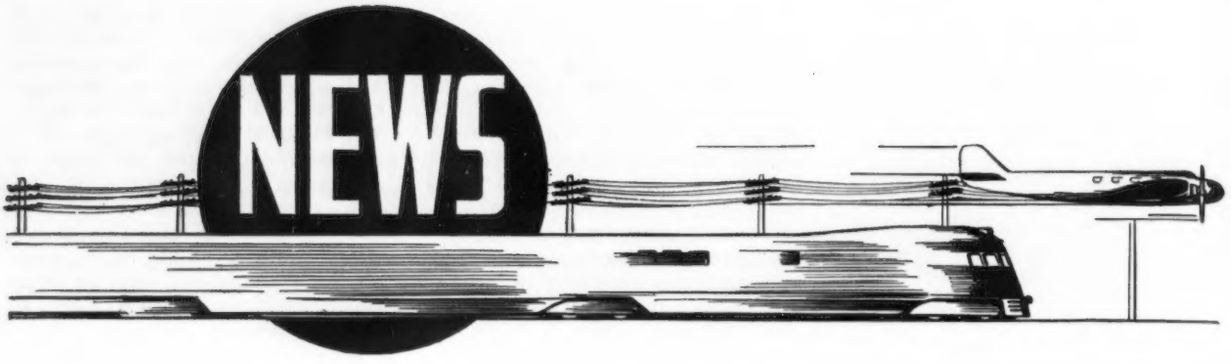

Supreme Court Stops Price Cutting In Trade-Marked or Branded Articles

PROTECTION of good will of manufacturers by preventing price cutting of trade-marked, branded and identified products was definitely given legal sanction by the Supreme Court of the United States in upholding the fair trade acts of Illinois and California. Under the decision, manufacturers are given the right to contract with resellers that resale prices to consumers or users shall be maintained.

The court held that while the title of a commodity changes hands when such a sale is made, the title to a trade-marked or branded name or other identification remained the property of the manufacturer. Consequently, the manufacturer is entitled to protection of his own property. This decision thus sets up the validity of contracts between manufacturer and reseller in states which have enabling legislation. It does not in any way concern unmarked or unbranded goods.

Loss Leaders Out

The principle has been fought for by all of the groups associated with loss-leaders over the years, so common to retail trades, and affects both manufacturers and distributing lines in all industries and trades.

The decision has set up speculation that it points toward a national fair-trade act which in itself would accomplish something which the National Industrial Recovery Act was unable to achieve. Another significant fact pointed out is that it is voluntary; for the decision provides an instrument for a system of voluntary contracts between the individual manufacturers and individual resellers. Manifestly this is a sharp shift from the direction of regimentation. There are authorities who believe that the far-reaching effect of this decision might well be to preclude the necessity of another NRA, as to much that was attempted under it. It is also known that it is the feeling among some who are close to the administration that the fair-trade practices section of governmental business relationship should be divorced from the labor practices. Actually some of the by-products of the decision would be to maintain minimum wages and maximum hours; for it will prevent price cutting and consequently unfair competition, which inevitably result in lowering of wages and lengthening of hours of work.

This is not to say legislation proposing revival of NRA in same form will not be attempted. It is obvious that such legislation will be sought but the decision readily lends itself to limiting such legislation at least.

Good Will is Property

Constitutionality of the Illinois fair-trade act was challenged by the Dearborn Distributing Co., enjoined by a State court from sell-

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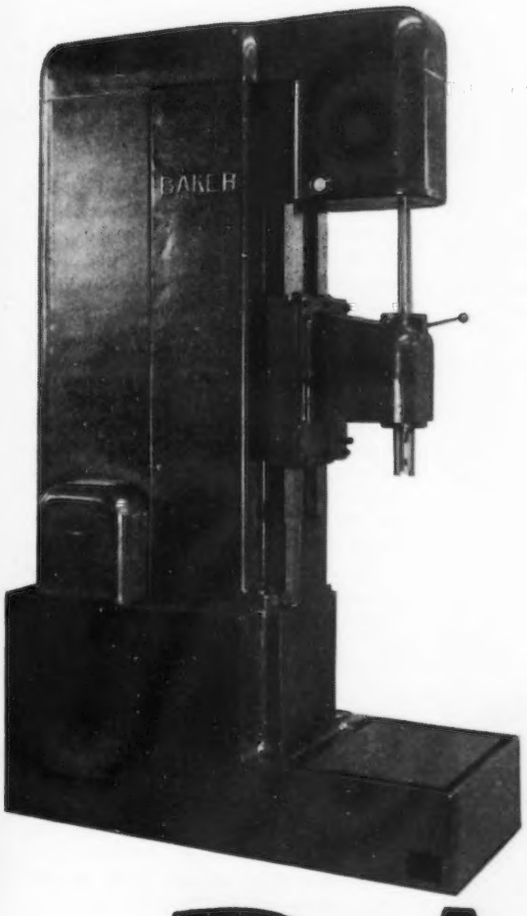

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ing "Seagram" below fixed prices in Illinois, and by McNeil's liquor store in Chicago, enjoined from selling "Schenley Products" at less than a fixed resale price. Mr. Justice Sutherland, who read the decision, stated that other cases arising under the California law presented substantially the same issues.

In upholding the right of a state to allow procedure to contract for the selling price of standard brands to prohibit price cutting, the court said:

"We are here not dealing with a commodity alone, but with a commodity plus the brand or trade-mark which it bears as evidence of its origin and of the quality of the commodity for which the brand or trade-mark stands.

"And good will is property in a very real sense, injury to which, like injury to any species of property, is a proper subject for legislation. Good will is a valuable contributing aid to business — sometimes the most valuable contributing asset of the producer or distributer of commodities. And distinctive trade-marks, labels and brands are legitimate aids to creation of such good will."

The court denied that the California and Illinois laws fixed prices or delegates power to fix prices to private persons. The court declared that the law contains "no element of compulsion but simply legalizes their acts, leaving them free to enter into the authorized contract or not as they may see fit."

Iron Ore Water Shipments This Year Show 58 Per Cent Increase Over 1935

SHIPMENTS of Lake Superior ore by water during 1936 were 44,822,023 tons, an increase of 16,463,314 tons or 58 per cent over 1935, when water shipments amounted to 28,358,800. The movement during November was 3,758,-151 tons.

LAKE ORE SHIPMENTS BY WATER

(Gross Tons)

	November	Season, 1936	Season, 1935
Escanaba	340,747	2,392,958	1,823,655
Marquette	359,544	4,284,377	2,963,603
Ashland	336,620	4,623,618	3,068,748
Superior	1,249,419	16,236,502	10,276,176
Duluth	1,053,484	11,738,528	6,995,979
Two Harbors	418,337	5,546,040	3,234,171

WATER SHIPMENTS OF LAST TEN YEARS

(Gross Tons)

1927	51,107,136	1932	3,567,985
1928	53,980,874	1933	21,623,898
1929	65,204,600	1934	22,249,600
1930	46,582,982	1935	28,358,800
1931	23,467,786	1936	44,822,023

Porcelain Enamelers Make 1937 Plans

WITH a schedule of more than 20 definite projects outlined for 1937, the Porcelain Enamel Institute reports that plans are rapidly nearing completion for launching the greatest program in the industry's history immediately after the first of the year.

Prominent among the 1937 projects are the first annual Enamelers Round Table Conference to be held in May at the University of Illinois, Porcelain Enamel Week, development of an all-porcelain enamel kitchen, revision of the industry's statistics as submitted to the Department of Commerce, trade show demonstrations and exhibits, publication of a handbook on cast iron enameling, retail sales training course, revision of terms handbook, establishment of an industry barometer and an intensive drive for new members.

The institute also plans to increase trade and business paper advertising in those publications that reach manufacturers, commercial users and retailers selling and promoting porcelain enameled products. A complete trade paper schedule will start in January.

More than two-thirds of the 1937 budget had been subscribed by Dec. 1, over 40 firms having already subscribed their quota.

At the three-day Round Table Conference next May, in addition to the general sessions, which will consist of all-industry round table discussions, the outline for a tentative program shows that sectional groups will discuss problems pertaining to the enameling of cast iron, sheet metal and hollow-ware.

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Morse Kelpo Free-Wheeling clutches are constructed with individually sprung cams, gear actuated to provide instant engagement when speeds synchronize. Alternate power units drive and release with perfect smoothness without backlash.

Sizes 1½ H.P. to 100 H.P. (per 100 R. P. M.) with FLEXIBLE COUPLINGS.

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Carnegie-Illinois Initiates Apprentice Training on Broad Scale

THE Carnegie-Illinois Steel Corp. has announced the inauguration of an expanded personnel training program designed to provide a smooth flow of competent manpower from below into positions made vacant by retirement or other causes, or created through production expansion. This is a part of an enlarged program of personnel training by all subsidiaries of the United States Steel Corp.

Upward of 200 young men have been made apprentices in eight Carnegie-Illinois plants in the Pittsburgh-Youngstown district, and in the Chicago district a similar program is being pushed along parallel lines.

The personnel training division at Pittsburgh, under the general direction of Russ L. Leffler, manager of industrial relations, has as its goal the maintenance of apprentice training in all district plants on a continuing basis under which eventually the company hopes to be able to provide from its own ranks the skilled new forces required at all plants.

In order to accomplish this program, the division has launched an elaborate four-phase plan of training. The first embraces the lengthy training of apprentices, over a four-year period and in more than a dozen mechanical classifications. The second phase covers the supplementary training of technical graduates in sales and the various branches of operations, through their employment in an "observation corps" in all mill departments. Supervisory forces will be given specialized training in the third classification. In the fourth, a miscellaneous grouping, the company plans, among other things, a "job training" program under which skilled workmen would be given additional study and instruction to enable them better to perform their work and to aid in standardization of operations looking to similar final results, at all company plants. Other avenues of instruction in this classification include studies in citizenship matters for the benefit of aliens seeking naturalization, and the better preparation of men for their work through night trade extension classes.

Initiation of the enlarged apprentice training program, the first actually to get under way, was traceable to several factors. The restriction of immigration has reduced the number of skilled workmen coming to the United States from other nations. Many skilled workmen, due to layoffs in the depression years, have deserted their trades to pursue other lines of endeavor and no longer are available in the metal trades. Other skilled workmen are lost to industry through retirement or death annually.

"While this would indicate an actual scarcity of skilled workmen," says the company, "this is not precisely true in all classifications. It is true, however, that in some instances it is difficult to obtain properly trained men for replacements. The essential phase of the training program is its applicability to the needs of the company for skilled men through future years.

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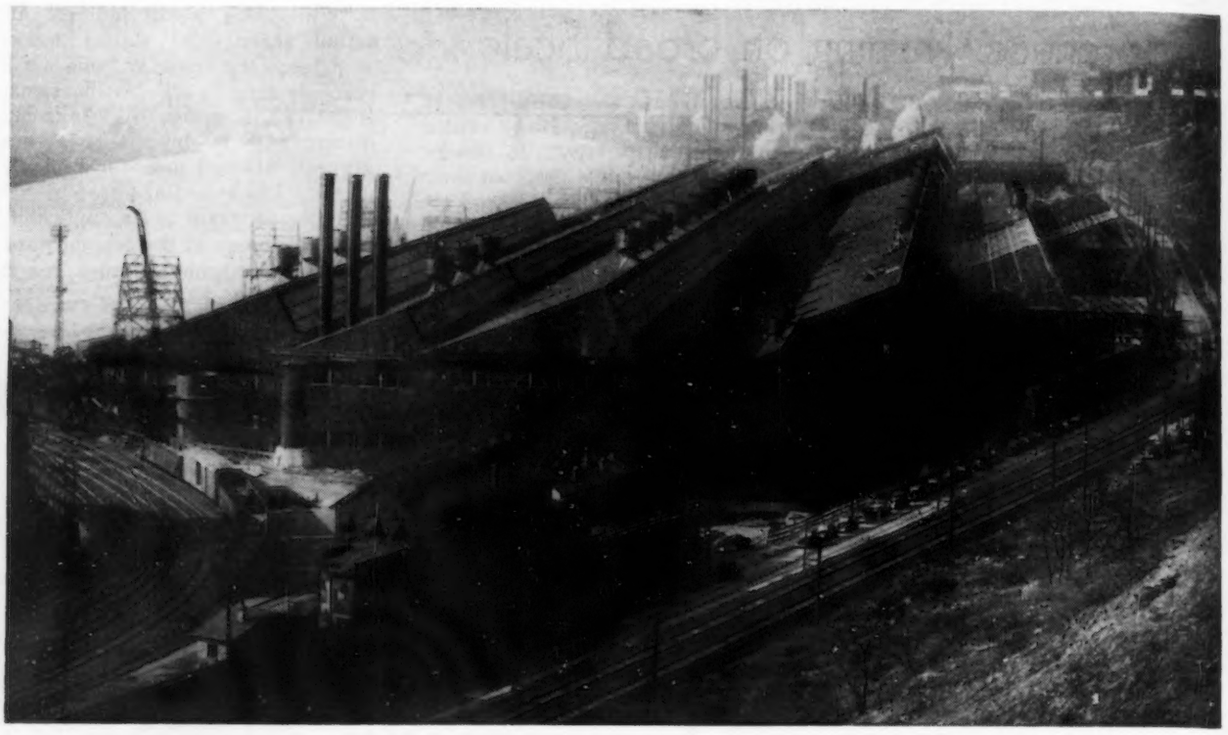


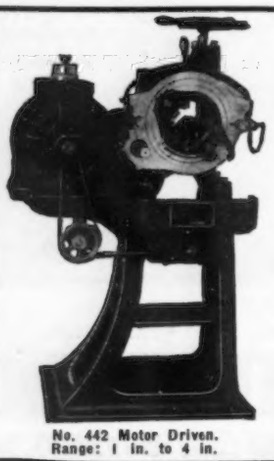
New Mill Building of Jones & Laughlin Steel Corp. Where Continuous Unit Has Been Installed

THE JONES & LAUGHLIN Steel Corp.'s new continuous sheet and strip mill, which will be in operation shortly, is housed in the new buildings above illustrated. This new installation with buildings and auxiliary equipment cost approximately $25,000,000 and marks the entry of Jones & Laughlin into the manufacture of sheets and strip. The new plant will have capacity for 60,000 gross tons of hot and cold-rolled sheets, wide and narrow strip, light plates, skelp and hot-rolled strip coils for cold reduction in the tin plate department of the Aliquippa works.

Allegheny Steel Has Expended $1,000,000

PLANT improvements and extensions effected by Allegheny Steel Co. during 1936 will approximate $1,000,000, according to W. F. Detwiler, vice-president of the company. Two additional open-hearth furnaces have been put in operation and the bar mill enlarged to produce billets.

At the West Leechburg plant, which was acquired last summer by merger, a new modern office building has been erected and the mill equipment augmented by two electric annealing furnaces, two normalizing furnaces, a continuous pickler on the 12-in. rolling mill and an extension to the cold-rolled strip plant. Auxiliary equipment, such as shears, levelers and slitters have also been installed. Improvements at this plant are increasing its capacity on alloy steel strip.



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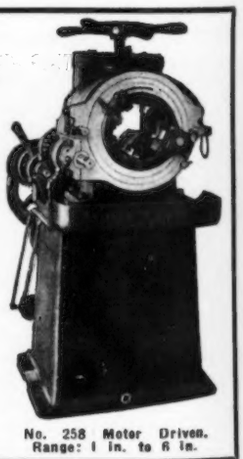


No. 258 Motor Driven. Range: ⅛ in. to 6 in.

Standards Group Adds to Roster

AT last week's annual dinner meeting of the American Standards Association, five new members, all national organizations, were announced, bringing the membership to 56 national organizations, including technical societies, trade associations and departments of the Federal Government, and some 1800 companies. The new members are: Industrial Safety Equipment Association, Metal Lath Manufacturers Association, National Association of Motor Bus Operators, Association of Gas Appliance and Equipment Manufacturers, and American Gear Manufacturers Association. The purpose of the association is to serve as a national clearing house for standardization and safety code work. A new building code is being formulated, and a series of codes for the prevention of occupational diseases such as silicosis is being developed.

Berger Again to Make Building Products

THE Berger Mfg. Co., Canton, Ohio, Republic Steel Corp. subsidiary, will reenter the building products fabrication field, in which it has not been active for several years, with a complete line of building products, according to L. S. Hamaker, executive vice-president and general manager.

The new line will be manufactured under the Berloy trademark and will supplement the company's present line of sheet metal products. R. I. Schuppener, who has had more than 20 years' experience as a sales executive with the Milcor Steel Co., the Klauer Mfg. Co., and Wheeling Corrugating Co., will act as general sales manager of the new division.

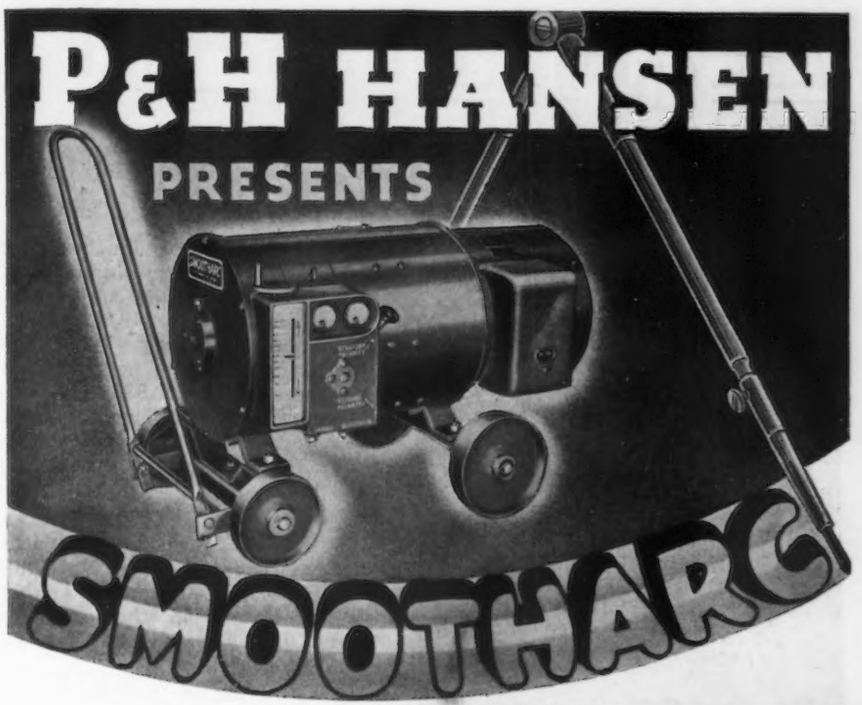
Among the products which the company will start producing shortly after Jan. 1 are eaves troughs, conductor pipe, gutters, valleys, and ridgings. In addition they will have complete lines of trimmings and accessories, galvanized and black sheets, ternes and coke plates. Other products will include roofing, siding, shingles, metal ceiling, metal lath, corner beads, channels and accessories. Metal windows, metal lumber, coal windows, wire products, furnace and ventilating pipe and accessories will also be produced.

The new building line will utilize Republic products including Toncan iron, copper bearing steel, and galvanized steel, and will be distributed through jobbers and dealers. Where necessary, the company will supplement its distribution facilities with its own branches.

Modern automatic equipment is now being installed and it is expected that operations in the new department will start immediately after the first of the year. There is a possibility that additional building space will have to be provided for the steel building products division.

World Tin Consumption Shows Increase

A CONTINUED upward trend in world consumption of tin during the current year is indicated in statistics recently made public by the International Tin Research and Development Council, according to a report from the American consulate-general, London, made public by the Commerce Department. Apparent world consumption of tin in



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Smootharc welding . . . the perfect, complete fusion of metal to metal by uniform welding heat . . . is tangible proof of the merits of an advanced welding generator — the P&H-Hansen Smootharc Welder.

Put the Smootharc Welder to any test — in tight corners — hard-to-get-at-places — in the "pinches" — for arc stability, uniform current, penetration, metal deposit . . . and you will find a welder that measures up beyond your expectations.

Smootharc Features » » »
High electrical efficiency — all controls centrally grouped — easy and accurate single current control — one-way, positive ventilation — close coupled, compact design, no projecting parts — minimum weight, easy portability — all-welded construction — drip-proof — enclosed.

. . .

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the 12 months ended Sept. 30, 1936, the report shows, amounted to 153,751 tons compared with 134,916 tons in the preceding year, an increase of 14 per cent. World production of tin in the two periods compared amounted to 156,032 tons and 124,585 tons, respectively, it was stated.

Russia and the United States showed the largest percentage increases in 1935-36 as compared with the preceding year; British consumption registered a negligible increase while German consumption declined appreciably. Consumption in the United States totaled 71,218 tons, compared with 56,771 tons in the 1934-35 period. Out of the total of 151,200 tons of tin employed in manufacture throughout the world in the year ended Sept. 30 last, it is estimated that 57,200 tons was used in tin plate manufacture, 12,800 tons in the motor vehicle industry, and 81,200 tons in other industries, the report states.

World output of tin plate in the year ended Sept. 30, 1936, advanced to the record total of 3,522,000 tons compared with 3,097,000 tons in the preceding year.

U. S. Steel Shipments Lower in November

SHIPMENTS of finished steel products by subsidiary companies of the United States Steel Corp. amounted to 882,643 tons in November, a decrease of 124,774 tons from the preceding month, but an increase of 200,823 tons over November, 1935. The shipments were larger than for any November since 1929, when they were 1,037,368 tons.

Based on deliveries, the corporation's finished steel-making facilities were engaged during November at 59.2 per cent of capacity, against 62.6 per cent in the preceding month and 42.3 per cent for November, 1935.

Total shipments for the first 11 months this year amounted to 9,757,767 tons, an increase of 3,047,983 tons, or 45.4 per cent, over the 6,709,784 tons moved in the corresponding period of 1935.

Industry Absorbing Many Workers

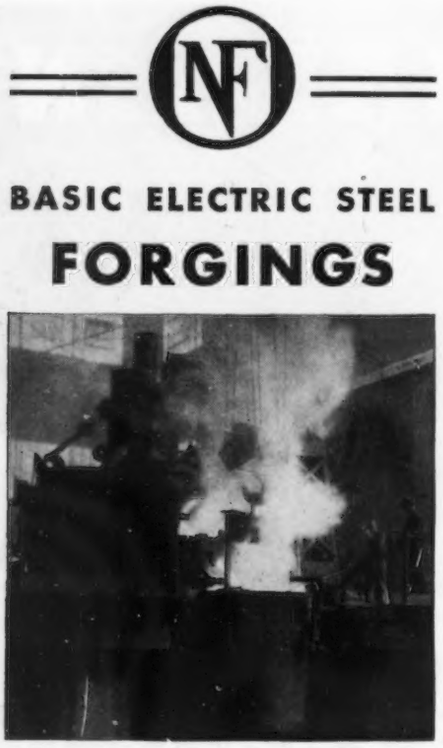
BETWEEN mid-September and mid-October, weekly pay rolls increased $16,300,000 as 220,000 workers were engaged by various industries. Compared with a year ago, employment in these industries has increased more than 1,000,000 workers. Although these figures, which were published in the December issue of Survey of Current Business, Department of Commerce, Washington, do not measure the full extent of private reemployment throughout the year, the number of unemployed on private jobs is still very large, more than 6¾ million persons being registered with the United States Employment Service alone.

Of 89 manufacturing industries surveyed, 70 reported gains in employment in October as compared with September. Employment in durable goods industries was up 4 per cent, while that in non-durable goods industries was 1.1 per cent less.

A new product for preparing metal before the paint finish is applied, known as Rusticide "50," which is said to clean and etch, leaving a rust-proofed surface ideally conditioned for painting has been developed by Rusticide Products Co., Cleveland. The new product immediately dissolves oil, wax and surface oxidation from the metal, according to the makers, and is non-inflammable, non-explosive and nontoxic.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORP.

Month	1933 Shipments	1933 Per Cent of Capacity	1934 Shipments	1934 Per Cent of Capacity	1935 Shipments	1935 Per Cent of Capacity	1936 Shipments	1936 Per Cent of Capacity
January	285,137	17.7	331,777	19.8	534,055	31.9	721,414	44.8
February	275,929	18.5	385,500	25.9	583,137	39.2	676,315	45.3
March	256,793	15.3	588,209	35.2	668,056	41.5	783,552	50.5
April	335,321	21.6	643,009	41.5	591,728	36.7	979,907	63.2
May	455,302	27.1	745,063	44.5	598,915	35.8	984,097	63.4
June	603,937	37.4	985,337	61.2	578,108	36.7	886,065	57.1
July	701,322	45.1	369,938	23.9	547,794	34.0	950,851	61.3
August	668,155	39.8	378,023	22.6	624,497	37.3	923,703	59.6
September	575,161	35.6	370,306	23.9	614,933	39.7	961,803	62.0
October	572,897	35.5	343,962	20.6	686,741	41.1	1,007,417	62.6
November	430,358	26.7	366,119	22.7	681,820	42.3	882,643	59.2
December	600,639	38.7	418,630	27.0	661,515	42.7	.....	...
Plus or minus yearly adjustment	(44,283)	...	(19,907)	...	.....	...	.....	...
Total for year..	5,805,235	30.1	5,905,966	30.6	7,371,299	38.3	.....	...



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FORGINGS

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Carbon, Alloy, Corrosion Resistant and Special Steels Smooth Forged, Hollow Bored, Rough or Finished Machined, Heat Treated to Specifications . . . Forging Quality Ingots, Pressed or Hammered Billets.

NATIONAL FORGE AND ORDNANCE COMPANY

IRVINE, WARREN COUNTY, PENNA.

. . PERSONALS . .

J. A. KRUGLER, who has served the Taylor-Wharton Iron & Steel Co., High Bridge, N. J., for the past 12 years as sales engineer in the mining field and subsequently at New York, has been appointed general sales manager, succeeding

J. A. KRUGLER

J. C. TAYLOR, JR., who recently resigned. Prior to his association with the company, Mr. Krugler was engaged in the railroad and mining engineering field. He was born in Pottstown, Pa., and attended Rensselaer Polytechnic Institute.

H. H. ERKELENZ, whose appointment as manager of engineering for the Harnischfeger Corp. was announced in these columns on Nov. 19, was graduated at the Technical College, Cologne, Germany.

G. S. MCKEE, heretofore head of the production engineering division of the Baldwin - Southwark Corp., Philadelphia, has been made general superintendent of the Globe-Wernicke Co. plant at Cincinnati. He was formerly associated with the Timken Roller Bearing Co., Canton, Ohio, as production manager.

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W. ARCH IRVIN has been appointed Pittsburgh district representative, with office at 2622 Koppers Building, for the Aetna-Standard Engineering Co., Youngstown.

❖ ❖ ❖

W. F. HOLTZMAN has been made manager of the Washington office of the Rawlplug Co., Inc., New York, with office at 50 Florida Avenue, N. E.

❖ ❖ ❖

GERALD R. BROPHY has been added to the development and research staff of the International Nickel Co., New York. He will be located at the company's research laboratory in Bayonne, N. J., and

SMOOTH ACCELERATION • • • POSITIVE SYNCHRONIZATION • REMOTE CONTROL • UNIFORM TORQUE • DEPENDABLE • SAFE • • POSITIVE ACTION

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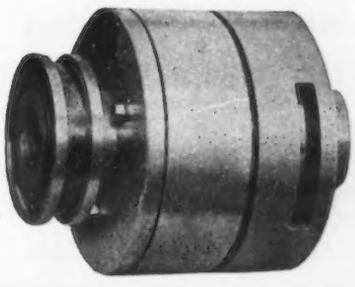
HIGH DUTY STEARNS MAGNETIC CLUTCHES & BRAKES



... STYLE C MULTIPLE DISC CLUTCH

In sizes 6 inches diameter upward, 2 to 8 discs, completely impregnated against moisture for operation in oil if desired. Possesses all advantages of large clutches; in addition to being compact, simple and sturdy.

will devote himself to problems relating to nickel alloy steels, nickel cast irons and other ferrous materials.

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A. E. WALKER, general manager of sales, Republic Steel Corp., president of Truscon Steel Co. and a director of other subsidiaries of Republic Steel, will become executive vice-president of Pittsburgh Steel Co. on Jan. 1, it was announced by Henry A. Roemer, president of Pittsburgh Steel Co. Mr. Walker has had 21 years of service with Republic.

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LAWRENCE V. CALHOUN, formerly purchasing agent for the Pettibone Mulliken Co., Chicago, has become associated as a sales representative with Briggs & Turivas, Blue Island, Ill., brokers of scrap iron and steel.

CECIL G. ROUSH, who has been appointed manager of the Kansas City office of the Westinghouse Electric & Mfg. Co.

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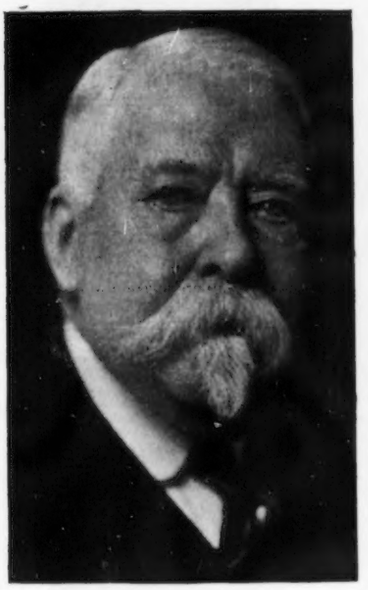
E. T. BENNINGTON, formerly hoist sales engineer in the Chicago territory for the Harnischfeger Corp., Milwaukee, has been put in charge of the corporation's branch office at 1603 Arcade Building, St. Louis.

...OBITUARY...

WILLIS LARIMER KING, a director of the Jones & Laughlin Steel Corp. and a veteran of the steel industry, died at his home in Pittsburgh on Dec. 11, following a short illness. For 67 of his 86 years Mr. King had been identified with Jones & Laughlin, having started there in 1869. For many years he was one of the outstanding leaders in the iron and steel industry.

Mr. King was born Feb. 14, 1851, on the edge of the Golden Triangle in Pittsburgh at the corner of Fourth Avenue and Grant Street. He was educated in the Pittsburgh public schools, at Newell's Academy in Pittsburgh and later at Washington and Jefferson College, then located at Canonsburg, Pa.



WILLIS L. KING

When Mr. King began as a clerk in the Jones & Laughlin order department, there were only five people in the general office. He advanced through various positions, principally in the selling end of the business, and in 1899 was elected secretary and a member of the board of managers of Jones &

"STEAM!" yells the Pickling Dept.

"You got it!" bellers the Power Plant

"WHAT YOU NEED is distribution," roars the Engineer. "Why don't you guys throw out that old soup strainer you got in your tank and put in a Duriron steam jet? Then I wouldn't hear so much belliachin' outa you."

Of course, pickling men know that—they know their process—the Power Plant can't tell them anything they don't already know.

But when steam demands are excessive . . . when the liquor in the tank varies from hot to lukewarm . . . when the stuff comes out spotty—it does indicate that better circulation, more even heating (and no steam hammering) will turn out better work, without kickbacks, at lower production costs.

Duriron Circulating Steam Jets deliver such results. We can name you plants right in your own district that have got 'em—and *like* 'em.

You ought to have Bulletin 165—write, and we'll send it to you.

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Laughlin's, Limited, and one year later was elected vice-chairman.

He was active in forming the Jones & Laughlin Steel Co. in 1902, which superseded Jones & Laughlin's, Limited, and was elected a director, vice-president, and a member of the executive committee of the company. In 1922, with the formation of the Jones & Laughlin Steel Corp., he was elected to fill these same positions which he held until 1934 when he retired as vice-president and member of the executive committee but retained his directorship.

On the occasion of the celebration of his sixtieth anniversary with the iron and steel industry in July, 1929, THE IRON AGE said in part:

"Going into the industry only four years after the close of the Civil War, Willis L. King, had a longer experience with the ups and downs of iron and steel manufacture in the United States than any of his contemporaries. Most important of the changes that came in Mr. King's long career was the practical abandonment of the manufacture of finished iron and the substitution of steel for all rolled products."

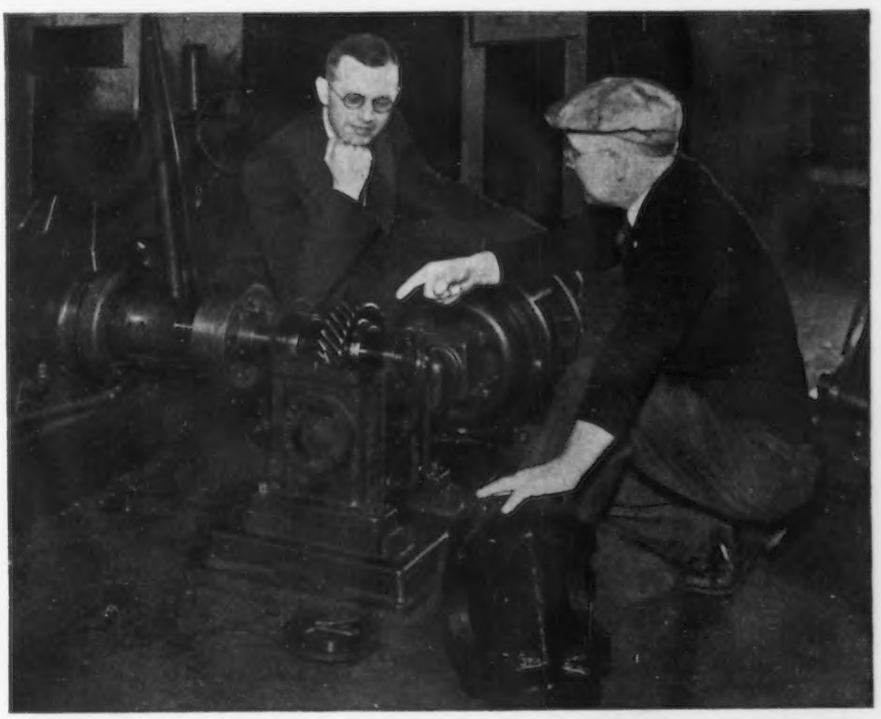
Known for many years as the "dean of the steel industry," Mr. King was active in the formation of the American Iron and Steel Institute in 1908 and was one of its directors until 1928. During most of that period he was also vice-president of the institute and since 1928 has been honorary vice-president. He was awarded the Gary Medal in 1933 by the American Iron and Steel Institute, which annually awards the medal for outstanding achievement in the iron and steel industry. The award to Mr. King was for his achievements as "a leader in inspiring high ideals and promoting confidence and good will in the welfare of the iron and steel industry."

Honorary pallbearers at the funeral held Monday afternoon were: James A. Farrell, Charles M. Schwab, and the following directors of the Jones & Laughlin Steel Corp.: M. C. Angloch, W. J. Creighton, W. D. Evans, Frederick E. Fieger, S. E. Hackett, B. F. Jones, 3rd, W. Larimer Jones, Jr., G. M. Laughlin, Jr., G. M. Laughlin, 3rd, Ledlie I. Laughlin, H. E. Lewis, W. C. Moreland, W. C. Robinson, W. B. Todd, J. C. Watson, and W. W. Willock.

❖ ❖ ❖

DR. CHARLES LEGEYT FORTESCUE, consulting transmission engineer of the Westinghouse Electric & Mfg. Co., died recently in his home in Pittsburgh. Dr. Fortescue was internationally famous for his work in curbing the effects of lightning on transmission lines and distribution systems.

The greatest of his contributions is the development of a branch of mathematics known as symmetrical coordinates. As this lies in the field of pure mathematics, it was of great value to educational institutions as well as to practical industry. Nearly 200 patents were credited to him covering a wide range of research, product development and protective devices. He designed the first 100,000-volt transformer for commercial service. Much of the development on the theory of transformer design was performed by him, either actively or in a consulting capacity. Born in York Factory, Canada, Nov. 7, 1876, he received his earlier education in Dawlish, South Devon, England. In 1898 he received his B. S. degree from Queen's University at Kingston, Ont., and then joined the Westinghouse Electric & Mfg. Co. In 1926 he was made consulting engineer on transmission, which position he occupied until his death.



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"Look at this Horsburgh & Scott Speed Reducer . . . that's the first time we've had the cover off in 11 years of continuous use. Some service, I'd say . . . and it looks good for a lot more years."

Here's why such service is possible . . . Simple in design . . . Heavy, wide-face gears, accurately cut . . . Anti-friction bearings . . . Heavy dust-tight housing . . . Oversize shafts and bearings . . . Splash lubrication. You owe it to yourself to investigate these finest of speed reducers.

Send for complete catalog on Speed Reducers and Gears.

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GEARS AND SPEED REDUCERS

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Ayres Forecasts Increasing Activity

PRESENTING his annual address before the Cleveland Chamber of Commerce on Tuesday, Col. Leonard P. Ayres, vice-president of the Cleveland Trust Co., undertook to examine the prospects for business in 1937. Some of the highlights of this address are as follow:

"It is an impressive fact that in this year of 1936, which is the fourth full year of recovery, the volumes of new factory building, of new commercial building, of public utility construction, of new railroad equipment, and of new corporate financing, are all below those of the lowest year of the depression of 1921. These conditions are particularly noteworthy in view of the fact that our population then was 20 millions less than it is now. They emphasize the retarding effects which may result from the tendency of managed economics to make future planning difficult and dangerous. Probably business forecasting in the future will largely consist of political interpretation.

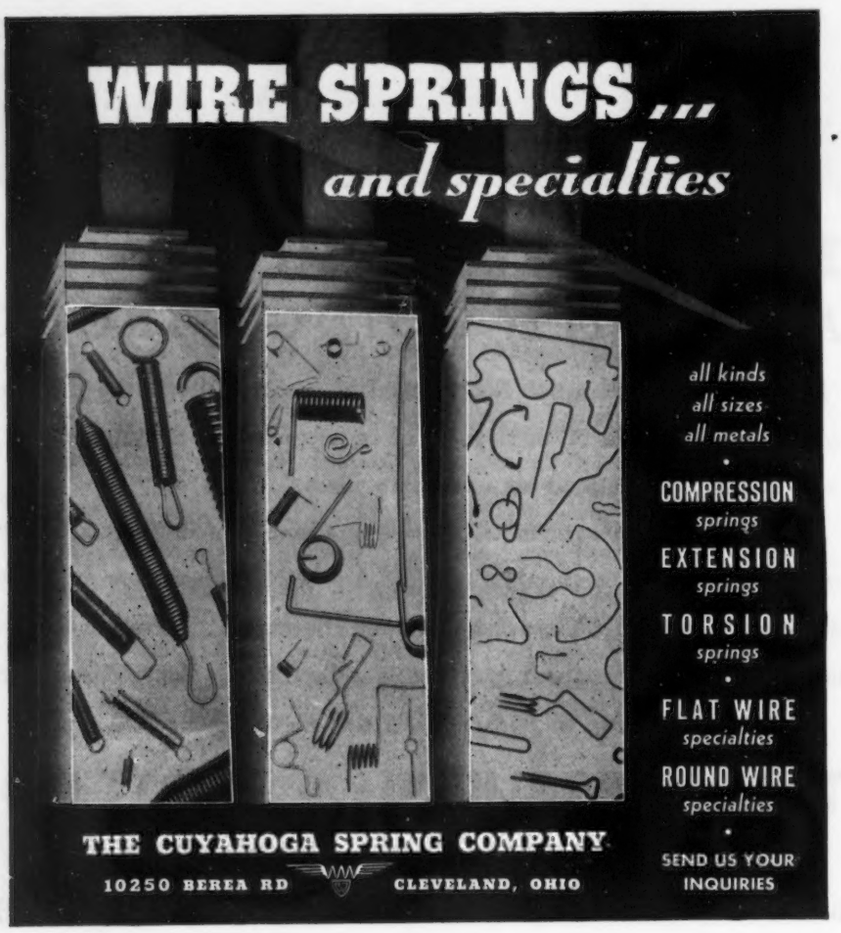
"We are at present well along in the process of recovery, and the rest of the world is still farther along. Recoveries are like depressions in that when they once get well started they acquire momentums that are almost physical in quality. This fact warrants us in reaching some general conclusions about the prospects for business in 1937 despite our new condition of managed economics. The conclusion that seems justified is that general business will be better in 1937 than it has been in 1936 in spite of the unrest that prevails in much of the world, the labor difficulties which may develop here, and the new legislation that the Congress may enact.

"It seems entirely probable that the volume of new construction will continue to increase next year. It is easy to demonstrate statistically that we should be entering upon a building boom, but that appears to be unlikely. Building booms develop in residential and commercial construction when rents are high as compared with costs of labor and material, and they develop in factory building when the volume of new corporate financing is high. None of those conditions now maintains. This country needs immense amounts of new construction of almost all types, but the conditions necessary to supply the demand have not developed. We should expect continuing increases, but no real boom as yet.

"The volume of railroad freight traffic promises to be larger next year than it has been this year. The increases will be largely dependent on the advances in the volume of construction. As rail traffic increases, the purchasing of new equipment by the roads will be greater, and the percentage of advance in the buying of new equipment will almost surely be greater than the percentage of increase in the freight traffic. The railroads have postponed as long as possible the purchasing of new rolling stock, but now their necessities have caught up with them, and the equipment industries will be the beneficiaries.

"The automotive industries have led the way out of this depression, and it seems probable that they will hold their leadership next year. It seems likely that the number of new cars and trucks produced in 1937 will be at least as large as the production of this year, and probably somewhat larger.

"Wholesale and retail commodity prices and the cost of living will probably advance next year, but it does not seem likely that the increases will be very large. It is quite unlikely that any price condition that could truly be termed inflation will develop in this country in 1937. Inflations develop when there is a shortage of goods along with an excess of money. They develop in countries having excessive stocks of money when business booms get under way and expanding industry begins in various lines to approach capacity outputs. Then buyers compete for the goods and prices mount."



Hanna Furnace Corp. To Build Coke Ovens

THE Hanna Furnace Corp., division of National Steel Corp., whose blast furnaces at Zug Island, near Detroit, furnish pig iron to National Steel's Great Lakes steel plant, has completed plans for construction of a battery of coke ovens adjacent to its blast furnaces at a cost of about $6,000,000.

SWOC Making New Recruiting Drive

PITTSBURGH, Dec. 15.—Using all the latest ballyhoo methods, including spotlights and loud speakers, the Steel Workers' Organizing Committee descended on the Homestead Works of the Carnegie-Illinois Steel Corp. before daylight one day last week as employees were being paid. Apparently expecting trouble, the organizers brought their legal adviser and bondsman with them. However, no resistance to their efforts was offered as they attempted to sign up workers leaving the mill. A loud speaker was used to harangue the workers, while a spotlight was played on a large sign reading, "Join the Union." Organizers distributed application blanks and in the best installment-buying manner informed the workers no dues would be necessary until February. This drive is part of an intensive attempt of the SWOC to organize the steel industry, and probably every mill in this district before long will receive a visit from the "Flying Squadron." A large number of men paid no attention to the organizers, others accepted the application blanks, throwing them away later, while others took them home to find out what it was all about.

Ludlum Buys Foundry For Stainless Castings

BUFFALO, Dec. 15. — Ludlum Steel Co. has purchased the Electric Alloy Corp. plant in River Road, town of Tonawanda, for a stainless steel castings foundry. Ludlum has been licensed by the Buffalo Electric Furnace Corp. to make stainless steel under the electric alloy method. The Electric Alloy Corp. will be dissolved, but the Buffalo Electric Furnace Co. will continue as a licensing firm.

Metals Symposium Scheduled at M. I. T.

THE rewards of cooperation in research in the field of metals through joint investigation of fundamental problems by physicists, metallurgists, and chemists will be discussed by leaders in these fields at a meeting to be held at the Massachusetts Institute of Technology, Jan. 28 and 29, under the auspices of the M. I. T. and the American Institute of Physics.

The purpose of the meeting is to discuss thoroughly recent developments in the physics and chemistry of metals, as well as the opportunities for still greater advances through the combined cooperative effort of all workers whose knowledge may in some way contribute to problems of mutual interest.

Some of the more general papers to be presented are: "Research Problems in the Steel Industry," by Dr. E. C. Bain, United States Steel Corp.; "Inclusions in Ferrous Alloys," by Dr. A. B. Kinzel, Union Carbide & Carbon Co.; "Flow Phenomena in Heavily Stressed Metals," by Prof. P. W. Bridgman of Harvard; "Electronic Structures in Metals and Alloys," by Prof. J. C. Slater, head of the M. I. T.'s department of physics; "Corrosion," by Dr. J. R. Burns of the Bell Laboratories; "Elastic Properties of Ferrous Alloys," by Prof. A. V. de Forest, of M. I. T.; and "Chromium - Nickel - Iron Alloys," discussed by Dr. V. N. Krivobok of the Allegheny Steel Co.

10 REASONS WHY BUYERS SELECT YALE CHAIN HOISTS

Because... Yale Chain Hoists have an international reputation for QUALITY and that quality is based on the outstanding features of construction, as follows:

1 Heavy forged steel safety hook and cross head designed to withstand shock.

2 Heavy wrought steel suspension plates support the load between the top hook cross head and load sheave.

3 The load sheave on which the load is lifted is a massive special analysis steel casting.

4 The driving pinion is a one-piece forging of special steel.

5 Ball bearings upon which the load sheave is mounted are of high carbon chrome alloy steel running in chrome vanadium steel races.

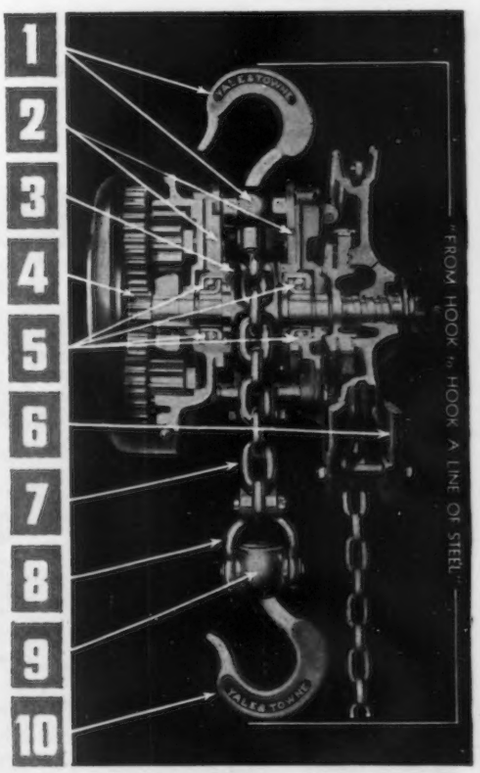
6 A continuous and adjustable hand chain guide prevents snagging—with a tensile strength of 50,000 lbs.

7 The load chain is of steel, welded and heat treated.

8 Drop forged two-piece shackles with heat-treated suspension pin permit changing or replacing load chain without welding.

9 Lower hook is equipped with heavy duty ball bearing, completely enclosed, packed in grease, requires no further lubrication.

10 Steel safety hook opens slowly without fracture before any other part of the hoist is overstrained—protects operator and load.



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The Yale Distributor is no further away from you than your telephone. The hundreds of Industrial Supply organizations who feature Yale Products cover the entire country. In every industrial center they are business leaders, serving industry swiftly, efficiently and economically. Yale Chain Hoists and allied equipment are sold only through Yale Distributors—in order to provide American industry with the fastest, most satisfactory kind of service.

TRADE YALE MARK

THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION, Philadelphia, Pa., U. S. A.

Republic's New Mill To Be 98-in. Wide

PITTSBURGH, Dec. 15.—United Engineering & Foundry Co. has received an order for a 44-in. blooming mill from Republic Steel Corp. which will be built in conjunction with the huge hot and cold continuous sheet-strip mill which Republic ordered from United Engineering recently.

The blooming mill, which will be installed at the Cleveland division of Republic Steel with the continuous mills, will be a duplicate of the blooming mill United Engineering built for the Ford Motor Co. and a duplicate of the one United is now constructing for Richard Thomas, Ltd., for installation in England.

An important change in the specifications for the hot and cold sheet-strip mills also has been made by Republic. Both the hot and cold mills have been revised to be 98-in. mills. They will roll continuous strip up to 92 in. wide.

The orders received by United Engineering cover all handling equipment for these mills, including levelers, shears, trimmers and piling equipment.

Stabilization of Employment to Gain

GREATER employment stability than has existed in the past will probably develop in the near future, partly because of efforts currently being made by many companies to give their workers greater job security and also as a consequence of the Social Security Act. This fact is brought out in a study, "Employment: A Right or an Opportunity?" just published by the National Industrial Conference Board.

Many companies, particularly large ones, the board's study points out, are genuinely interested in making possible greater job security for their employees and are actively studying the problem of ways and means of accomplishing this result.

Attempts to smooth off extreme fluctuations in employment have been undertaken by many progressive companies in recent years. A few have reached the point of guaranteeing employment or annual income to their regular working force. Others have not reached

Machine Tool Orders Rising

DESPITE a short month broken by holidays, machine tool orders reported by the National Machine Tool Builders' Association gained appreciably in November. The association's index of orders booked rose to 147.1, within 3 points of the highest for the year. This was an increase of 8 per cent over the October volume. Domestic orders approximately equaled the best month's domestic business of the year, recorded in April. Foreign orders, which rose 17 per cent over October, exceeded any month since July, and accounted for 25 per cent of the total business placed in November.

Considerably more than half the companies which report to the association have recently equaled or bettered their 1926 volume of business, a year considered normal for purposes of comparison. Almost one-fourth of the reporting establishments are doing twice as much or more business than in 1926.

Sees Large Demand For Mill Equipment

EXPANDING activity in the steel industry has been reflected in sharp increases in the demand for rolling mill equipment in addition to entirely new rolling mill installations, and this is a forerunner of the great demand facing engineering equipment companies, according to Frank Cordes, president of the Blaw-Knox Co., Pittsburgh.

The steel industry is operating at such a rate that probably all steel-making units, such as blast furnaces and open hearths, are working virtually at their practical capacity so that when the demand for heavy steel for railroads and building construction develops more fully, it will probably be necessary to build additional open-hearth furnaces and to modernize existing facilities, says Mr. Cordes.

SHEPARD NILES

Overhead Traveling Cranes

1 TO 450 TONS CAPACITY

TYPES: SINGLE OR TWIN HOOK; AUXILIARY HOIST; GRAB BUCKET; EXTENSION; CLOSE CLEARANCE; SUBMERGED TROLLEY. FLOOR OR CAGE CONTROL. WRITE FOR BULLETINS

SHEPARD NILES CRANE & HOIST CORP.

356 Schuyler Ave., Montour Falls, N.Y. · Export: 111 B'dway, N. Y. C.

MOST COMPREHENSIVE LINE OF CRANES & HOISTS

Exports in Sharp Rise — Imports Also Higher

Imports (In Gross Tons)

	October		Ten Months Ended October	
	1936	1935	1936	1935
Pig iron	7,264	17,168	144,871	99,098
Sponge iron	181	123	1,590	1,089
Ferromanganese[1]	3,914	....	22,037	....
Spiegeleisen	4,532	6,540	35,339	41,668
Ferrochrome[2]	10	....	31	1
Ferrosilicon[3]	6	34	453	605
Other ferroalloys[4]	....	....	526	1
Scrap	18,532	11,129	115,671	38,371
Pig iron, ferroalloys and scrap	*34,439*	*34,994*	*320,518*	*180,833*
Steel ingots, blooms, etc.	4	361	83	1,962
Billets, whether solid or hollow[5]	107	....	722	....
Wire rods	1,924	2,475	16,303	12,882
Semi-finished steel	*2,035*	*2,836*	*17,108*	*14,844*
Concrete reinforcement bars	151	76	3,414	2,580
Hollow steel bars	169	141	1,767	1,001
Merchant steel bars	4,342	2,448	33,231	20,044
Iron slabs	....	....	....	....
Iron bars	165	158	1,172	1,318
Boiler and other plate	45	3	421	487
Sheets, skelp and saw plate	2,503	1,939	19,540	9,461
Die blocks or blanks, etc.[5]	16	....	174	....
Tin plate	36	18	181	174
Structural shapes	6,817	4,265	47,952	32,155
Sheet piling	132	225	2,329	225
Rails and track material	595	1,118	6,832	4,193
Welded pipe	354	678	5,103	3,857
Other pipe	5,549	1,295	25,034	13,679
Hoops and bands for baling	41	835	1,670	8,136
Cotton ties	2,225	1,741	19,980	18,709
Barbed wire	1,289	2,935	13,228	21,268
Round iron and steel wire	329	367	4,108	3,334
Telegraph and telephone wire	1	2	37	23
Flat wire and steel strips	218	214	2,383	1,492
Wire rope and strand	268	178	2,070	1,582
Other wire	381	212	1,734	1,095
Nails, tacks and staples	1,997	2,640	19,717	17,322
Bolts, nuts and rivets	12	6	425	239
Horse and mule shoes	60	18	360	509
Rolled and finished steel	*27,695*	*21,512*	*212,862*	*162,883*
Malleable iron pipe fittings	36	....	166	46
Cast iron pipe and fittings	199	3	576	30
Castings and forgings	105	128	1,054	1,064
Total	64,509	59,473	552,284	359,700

[1] Manganese Content. [2] Chrome Content. [3] Silicon Content. [4] Alloy Content. [5] New classes. No comparable figures for previous year.

Exports (In Gross Tons)

	October		Ten Months Ended October	
	1936	1935	1936	1935
Pig iron	246	125	1,936	2,689
Ferromanganese and spiegeleisen	110	47	444	89
Other ferroalloys[5]	40	....	1,997	....
Iron and steel scrap	119,568	145,850	1,709,572	1,797,410
Tin plate scrap	1,274	2,108	13,047	29,494
Waste-waste tin plate	4,515	2,489	33,344	18,533
Pig iron, ferroalloys and scrap	*125,753*	*150,619*	*1,760,340*	*1,848,215*
Ingots, blooms, billets, sheet bars	2,770	1,609	16,268	36,804
Skelp	16,003	13,212	49,240	45,489
Wire rods	2,775	2,473	29,912	21,351
Semi-finished steel	*21,548*	*17,294*	*95,420*	*103,644*
Bars, concrete reinforcement[5]	133	....	2,736	....
Bars, other steel	5,485	6,533	42,030	47,230
Iron bars	53	132	904	921
Plates, iron and steel	13,920	4,905	65,458	35,615
Sheets, galvanized steel	7,789	4,211	48,273	59,410
Sheets, galvanized iron	138	237	1,350	1,632
Sheets, black steel	13,132	6,646	112,321	83,220
Sheets, black iron	350	594	5,950	4,678
Hoops, bands, strip steel	5,400	4,803	50,685	36,984
Tin plate and taggers' tin	19,396	12,444	190,646	100,023
Terne plate (including long terne)	208	270	2,736	1,983
Structural shapes, plain material	7,418	3,649	49,834	28,488
Structural material, fabricated	8,364	874	21,826	17,757
Sheet piling	734	....	2,683	....
Tanks, steel	1,727	401	18,872	5,083
Steel rails	7,475	1,511	61,239	39,553
Rail fastenings, switches, spikes, etc.	1,382	699	10,829	8,074
Boiler tubes	1,094	793	6,045	7,607
Casing and oil line pipe	3,683	1,733	22,252	23,771
Pipe, black and galvanized, welded steel	1,483	1,920	15,884	28,419
Pipe, black and galvanized, welded iron	579	258	3,368	2,754
Plain wire	4,805	4,823	38,334	32,500
Barbed wire and woven wire fencing	3,391	3,671	29,018	27,739
Wire cloth and screening	85	95	907	878
Wire rope	240	196	2,718	3,300
Wire nails	725	1,045	6,572	8,985
Other nails and tacks	246	326	2,691	3,113
Other wire and manufactures	526	538	4,064	4,316
Bolts, nuts, rivets and washers, except track	713	538	5,432	5,388
Other finished steel	212	109	1,799	1,220
Rolled and finished steel	*110,886*	*63,954*	*827,456*	*620,641*
Cast iron pipe and fittings	1,470	2,780	15,502	15,090
Malleable iron screwed fittings	473	379	2,989	2,956
Carwheels and axles	539	1,543	6,486	14,112
Iron castings	545	855	5,928	7,520
Steel castings	358	164	2,813	2,299
Forgings	310	762	3,271	5,021
Castings and forgings	*3,695*	*6,483*	*36,989*	*46,998*
Total	261,882	238,350	2,720,205	2,619,498

EXPORTS of semi-finished and finished iron and steel products in October rose to 136,129 gross tons, according to the Metals and Minerals Division, Department of Commerce, and exceeded by 61 per cent the tonnage exported in September.

Tin plate was the leading item of exportation, amounting to 19,396 tons, valued at $1,928,552. Exports of black sheets were 13,132 tons, valued at $904,760; skelp, 16,003 tons, valued at $480,202; and fabricated shapes, 8307 tons, at $240,-151.

Reduced pig iron receipts were mainly responsible for the decline recorded in the aggregate of 45,977 tons of finished and semi-finished iron and steel products, valued at $2,220,797 imported into the United States during October. Contrasted with the totals reached in the previous month, the volume decline was 9.9 per cent.

Pig iron, from the standpoint of tonnage, recorded the sharpest decline, 7816 tons; followed by rails. 695 tons, and welded pipe, 640 tons. Structural shapes rose from 5211 in September to 6817 in October.

October Imports of Iron and Manganese Ores

(In Gross Tons)

	Iron Ore		Manganese Concentrates, 35 Per Cent or Over	
	1936	1935	1936	1935
Canada	33,981	95	....	....
Cuba	44,000	....	2,880	2,760
Chile	87,150	65,400	....	654
Spain	....	....	....	....
Norway	7,177	....	....	....
Sweden	16,836	8,884	....	....
French Africa	....	....	....	....
Russia	....	16,700	12,360	4,947
India	....	....	4,421	5,796
Brazil	....	....	3,683	3,507
Gold Coast	....	....	11,639	4,300
Other Countries	4,026	23,085	11	10
Total	193,170	114,164	34,994	21,974

October Imports of Pig Iron by Countries of Origin

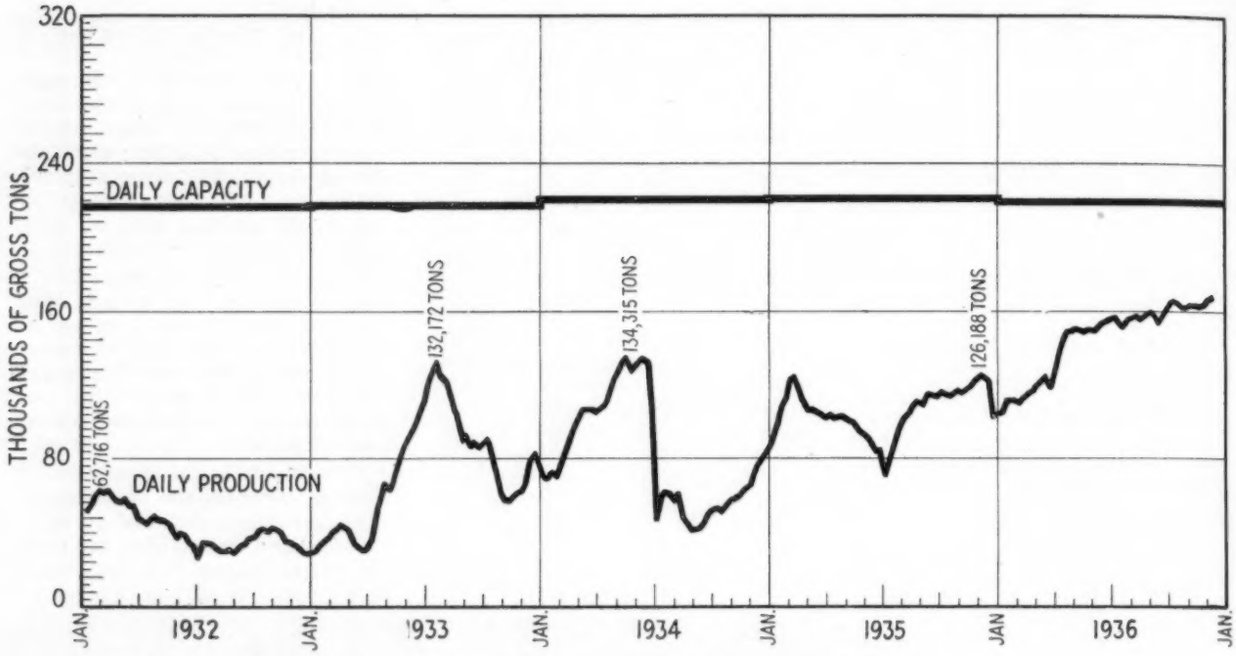
(In Gross Tons)

	October		Ten Months Ended October	
	1936	1935	1936	1935
United Kingdom	220	1,050	5,286	13,725
British India	3,241	3,130	48,039	27,613
Germany	420	358	4,549	3,271
Netherlands	2,408	6,366	54,318	31,315
Canada	63	2,427	9,656	11,889
France	....	....	....	50
Belgium	....	....	973	100
Norway	347	102	2,420	2,226
Sweden	260	....	689	647
Russia	305	3,735	18,495	7,408
All others	....	....	446	854
Total	7,264	17,168	144,871	99,098

STEEL INGOT PRODUCTION

Daily Tonnage of Bessemer and Open-Hearth Steel Ingots Produced by Weeks, 1932-1936

Current Week	Last Week	Weeks Ended Dec. 21, 1935	Dec. 22, 1934	Dec. 23, 1933	Dec. 24, 1932
173,384	*167,897	122,867	78,167	80,170	30,277



Figures for the current week are not indicated on the chart until the following week.

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

District	Current Week	Last Week	Weeks Ended Nov. 21, 1936	Dec. 21, 1935	Dec. 22, 1934
Pittsburgh	79.0	75.0	69.0	43.0	24.0
Chicago	77.5	77.5	76.0	61.0	36.5
Valleys	80.0	78.0	74.0	62.0	41.0
Philadelphia	54.5	54.5	55.0	38.0	25.0
Cleveland	76.0	76.0	78.0	82.0	54.0
Buffalo	84.0	84.0	84.0	42.0	35.0
Wheeling	94.0	94.0	93.0	78.0	70.0
Southern	69.5	69.5	69.5	50.0	29.0
Ohio River	91.0	91.0	95.0	82.0	50.0
Western	76.5	59.0	59.0	40.0	20.0
St. Louis	75.0	*75.0	70.0	64.0	25.0
Detroit	100.0	100.0	100.0	95.0	62.0
Eastern	85.0	85.0	85.0	40.0	30.0
Aggregate	79.0	76.5	74.0	55.5	35.5
Average Year to Date	66.9	*66.6	66.1	48.2	37.1

* Corrected.

Weekly Booking of Construction Steel

From THE IRON AGE

	Week Ended Dec. 15, 1936	Dec. 8, 1936	Nov. 17, 1936	Dec. 17, 1935	Year to Date 1936	1935
Fabricated structural steel awards	29,920	14,600	12,700	24,400	1,017,525	770,915
Fabricated plate awards	3,115	4,350	1,075	24,015	202,130	163,285
Steel sheet piling awards	0	0	400	2,500	53,960	66,025
Reinforcing bar awards	4,775	2,965	3,525	15,700	322,580	310,490
Total Lettings of Construction Steel	37,810	21,915	17,700	66,615	1,596,195	1,310,715

. . . SUMMARY OF THE WEEK. . . .

. . . Ingot rate advances to 79 per cent under heavy pressure to get out orders.

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. . . Shortages of coke, pig iron and raw steel may prevent much further increase.

o o o

. . . Steel scrap rises $1.25 at Pittsburgh; railroad equipment inquiries still large.

UNDER extreme pressure to get out the tremendous tonnages booked within the past few weeks, steel mills have increased operations in every possible way, causing a rise in the average ingot output for the country to 79 per cent. THE IRON AGE reports show that three companies are operating at 100 per cent of rated capacity, several others are doing better than 90 per cent, and fully half of the integrated steel makers are producing at higher than the average rate for the industry as a whole.

Although the present rate undoubtedly will continue for several weeks at least, further expansion of production will be hindered by shortages that exist, principally in coke, pig iron and raw steel. A large company, which has ample by-product coke ovens for normal requirements, has been trying to purchase beehive coke for additional blast furnace operation, but the limit of output by beehive ovens has virtually been reached unless there is expensive rebuilding. Beehive coke has advanced 15c. a ton for the furnace grade and 25c. for the foundry grade.

Coke shortage will be a deterrent to further pig iron production, and there is fear that some active blast furnaces may be forced to go out soon for relining, one already having done so. The shortage of ingots at many plants is shown by the fact that rail mills, though heavily loaded with orders, are operating at only 50 per cent for the present, as most of the rails on the books will not be shipped until the first quarter.

The Pittsburgh district rate has scored the sharpest advance this week—four points to 79 per cent, but there has also been a gain of two points to 80 per cent at Youngstown, while in the Chicago area the limit of practical capacity has been reached at 77½ per cent, and the same may be said for some other districts.

THE rising trend of operations and unfilled orders has been accompanied by the sharpest advance in steel scrap prices that has been recorded within a single week in years. At Pittsburgh the rise is $1.25 a ton to $19, based on a substantial sale to a mill, and there have been advances of 75c. at Chicago and 50c. at Philadelphia, bringing THE IRON AGE composite price to $17.33, the highest since Jan. 29, 1929.

After the flood of orders in late November and early December, the steel industry is experiencing what, by comparison, might be termed a lull, although the volume of incoming orders would still be considered good by all normal comparisons. For example, the first 10 days of December brought orders to some companies that were from 100 to 300 per cent over those in the same period of November. Another illustration of the astounding volume is that two weeks' business of one large producer was in excess of that received in any comparable period on record, not excluding the war time and boom years like 1920 and 1929.

Buying has subsided principally in those products no longer obtainable at fourth quarter prices, such as sheets, strip and wire products, while in plates and shapes the protection of the low price to Dec. 31 on pending construction projects, including railroad equipment, is bringing rising sales totals on those products. Meanwhile, some consumers, including automobile manufacturers, who did not secure enough sheets at the old prices, have bought for February shipment at the new prices. A striking feature of recent coverage is that there are no requirements' contracts, such as have usually preceded a price advance, all orders being firm. Thus the usual effects of speculative buying will be mitigated.

Railroad equipment buying is adding heavily to steel mill orders, and upward of 18,000 freight cars, now on inquiry, will soon be placed owing to the withdrawal of price protection Dec. 31. In addition to inquiries previously published, the following have come into the market: Missouri Pacific 4075 cars; Illinois Central, 2000; Baltimore & Ohio, 1500; Erie, 1500; Missouri-Kansas-Texas, 1150; Western Maryland, 750; Chicago & North Western, 500 and 23 coaches; Burlington, 300; Denver & Rio Grande Western, 100, while the Pennsylvania may buy 2500 and conduct a large repair program, and the New York Central has inaugurated a sizable repair program. Southern Pacific has ordered 28 locomotives and 1175 additional freight cars, the Bessemer & Lake Erie, 12 locomotives, Union Railroad, four locomotives.

. . . PITTSBURGH . . .

. . . Steel ingot output moves up sharply to 79 per cent of capacity.

o o o

. . . Present rate probably will be maintained at least through January.

o o o

. . . Heavy melting steel scrap rises $1.25 a ton on large sale.

PITTSBURGH, Dec. 15.—Steel ingot output in the Pittsburgh district has risen sharply to 79 per cent of capacity, a gain of four points. This is the highest rate attained since early 1930 and probably represents about as high as the district can go on account of the condition of some steel-making equipment. Wheeling district output remains unchanged at 94 per cent of capacity.

While the Pittsburgh rate may fluctuate slightly over the next several weeks, it will probably be maintained around the present levels for at least the remainder of this month, with no likelihood of any sharp leveling off in January.

Meanwhile, producers of sheet and strip steel are turning their attention to the tremendous job on hand in getting fourth quarter priced material out by the end of January. To do this it will be necessary to schedule finishing mills at practical capacity over the next month and a half.

Orders for semi-finished steel, bars, plates and shapes are pouring in and producers will undoubtedly be filled up within the next week or so. Some have already turned down orders for semi-finished steel, while others have had to allot tonnages. Inquiries on identified projects are coming to life rapidly and before the end of the year a substantial backlog of heavy plates and shapes will exist.

Although no formal announcements on first quarter prices for skelp steel have been made in this district, it now appears that fourth quarter quotations will be reaffirmed. Light rails and floor plates have been advanced $3 a ton for first quarter delivery. An announcement of an advance in price of reinforcing steel will probably be issued before the end of the month, and there is a possibility that the new prices will become effective immediately.

The raw materials market has been exhibiting exceptional strength during the past week. With some steel mills inquiring for large tonnages of beehive furnace coke, and not being able to find a supplier, beehive furnace coke quotations f.o.b. Connellsville prompt, have moved up 15c. to a range of $4 to $4.25 a ton. Foundry beehive coke has advanced 25c. a ton to $4.50, f.o.b. Connellsville. Scrap has moved up $1.25 a ton on the strength of a substantial sale made at $19.25 delivered Pittsburgh.

Pig Iron

Shipments are exceptionally heavy and in some cases stocks at producers' plants have been reduced to negligible quantities. With one steel company in this district and one in the Valley having withdrawn from the merchant trade market, there is abundant evidence that pig iron will be a scarce article within the next month. Already some companies are faced with a shortage of steel-making iron and should it become necessary to take furnaces off for relining the situation would assume serious proportions.

Semi-Finished Steel

With some mills out of the market, others allotting tonnages and a few still taking orders, demand for semi-finished steel is greater than at any time since 1929. Movement of sheet bars to non-integrated mills is exceptionally heavy. Although the greater portion of steel moving to non-integrated mills is to escape the price advance, there is no evidence of undue stocking when the outlook for consumption of finished products is taken into consideration. As yet no formal announcement on skelp prices for the first quarter has been made in this district. It now looks as if fourth quarter quotations will be reaffirmed.

Bolts, Nuts and Rivets

Immediately following price advance announcements, orders from customers who are protected by contracts began to roll in at a high rate. Aggregate specifications this week are much above those received last week. Sources specifying freely are railroad car builders, railroad repair shops, structural interests and automobile manufacturers. Enough business has been received to assure good operations for some time to come and a let-up in the influx of orders is not now in sight.

Bars

Further substantial increases in hot rolled bar bookings have taken place in the past week. At the rate new orders are being received, producers will be out of the market within a week or so. Specifications are emanating from practically every source, with the automobile industry the heaviest buyer. Manufacturers of consumers goods have, in many cases, found their machinery taxed to capacity and much of the present bar business is going into new equipment to alleviate this situation. Backlogs are increasing rapidly and finishing mills will be taxed to the utmost if all fourth quarter tonnage is to be moved from the mills by Jan. 31, which is the intention of producers. The tremendous increase in alloy bar demand has shown no signs of subsiding. While a large part of this tonnage is going to automobile makers, farm implement and tractor manufacturers are specifying heavily.

Cold-Finished Bars

The past week has seen a further increase in cold-finished bar specifications. Bookings are pouring in from every source. Heavy tonnages are being ordered by automotive manufacturers and the volume of new business being placed by implement manufacturers indicate this source will establish new production records early next year. Although jobbers have been specifying quite freely, it is expected

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Dec. 15, 1936	Dec. 8, 1936	Nov. 17, 1936	Dec. 17, 1935
Rails, heavy, at mill	$39.00	$39.00	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	32.00	32.00	32.00	29.00
Sheet bars, Pittsburgh	32.00	32.00	32.00	30.00
Slabs, Pittsburgh	32.00	32.00	32.00	29.00
Forging billets, Pittsburgh	39.00	39.00	39.00	35.00
Wire rods, Nos. 4 and 5, P'gh	43.00	43.00	40.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.80	1.80	1.80	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.05	2.05	2.05	1.85
Bars, Chicago	2.10	2.10	2.10	1.90
Bars, Cleveland	2.10	2.10	2.10	1.90
Bars, New York	2.40	2.40	2.40	2.20
Plates, Pittsburgh	1.90	1.90	1.90	1.80
Plates, Chicago	1.95	1.95	1.95	1.85
Plates, New York	2.19	2.19	2.19	2.09
Structural shapes, Pittsburgh	1.90	1.90	1.90	1.80
Structural shapes, Chicago	1.95	1.95	1.95	1.85
Structural shapes, New York	2.16¼	2.16¼	2.16¼	2.06¼
Cold-finished bars, Pittsburgh	2.35	2.35	2.35	1.95
Hot-rolled strips, Pittsburgh	2.15	2.15	1.95	1.85
Cold-rolled strips, Pittsburgh	2.85	2.85	2.60	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.80	2.80	2.60	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.90	2.90	2.70	2.50
Sheets, galv., No. 24, P'gh	3.40	3.40	3.20	3.10
Sheets, galv., No. 24, Gary	3.50	3.50	3.30	3.20
Hot-rolled sheets, No. 10, Pittsburgh	2.15	2.15	1.95	1.85
Hot-rolled sheets, No. 10, Gary	2.25	2.25	2.05	1.95
Cold-rolled sheets, No. 20, Pittsburgh	3.25	3.25	3.05	2.95
Cold-rolled sheets, No. 20, Gary	3.35	3.35	3.15	3.05
Wire nails, Pittsburgh	2.25	2.25	2.05	2.40
Wire nails, Chicago dist. mill	2.30	2.30	2.10	2.45
Plain wire, Pittsburgh	2.60	2.60	2.50	2.30
Plain wire, Chicago dist. mill	2.65	2.65	2.55	2.35
Barbed wire, galv., P'gh	2.70	2.70	2.55	2.80
Barbed wire, galv., Chicago dist. mill	2.75	2.75	2.60	2.85
Tin plate, 100-lb. box, P'gh	$5.25	$5.25	$5.25	$5.25

Pig Iron

Per Gross Ton:	Dec. 15, 1936	Dec. 8, 1936	Nov. 17, 1936	Dec. 17, 1935
No. 2 fdy., Philadelphia	$22.3132	$22.3132	$21.3132	$21.3132
No. 2, Valley furnace	20.50	20.50	19.50	19.50
No. 2, Southern Cin'ti	20.44	20.44	19.44	20.2007
No. 2, Birmingham†	16.88	16.88	15.88	15.50
No. 2, foundry, Chicago*	20.50	20.50	19.50	19.50
Basic, del'd eastern Pa.	21.8132	21.8132	20.8132	20.8132
Basic, Valley furnace	20.00	20.00	19.00	19.00
Malleable, Chicago*	20.50	20.50	19.50	19.50
Malleable, Valley	20.50	20.50	19.50	19.50
L. S. charcoal, Chicago	26.2528	26.2528	25.7528	25.2528
Ferromanganese, seab'd, carlots	80.00	80.00	75.00	85.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	**$19.00**	$17.75	$17.25	$14.25
Heavy melting steel, Phila.	**15.75**	15.25	14.75	12.50
Heavy melting steel, Ch'go	**17.25**	16.50	16.50	13.25
Carwheels, Chicago	**18.00**	17.00	16.50	13.25
Carwheels, Philadelphia	**17.25**	16.75	16.75	13.00
No. 1 cast, Pittsburgh	16.75	16.75	16.25	14.25
No. 1 cast, Philadelphia	**17.25**	16.75	16.75	13.00
No. 1 cast, Ch'go (net ton)	**15.00**	14.50	14.00	11.75
No. 1 RR. wrot., Phila.	15.75	15.75	15.75	12.25
No. 1 RR. wrot., Ch'go (net)	**15.00**	14.25	14.25	11.00

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	**$4.00**	$3.85	$3.75	$3.50
Foundry coke, prompt	**4.50**	4.25	4.25	4.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	**11.00**	10.50	10.50	9.00
Lake copper, New York	**11.12½**	10.62½	10.62½	9.37½
Tin (Straits), New York	**52.50**	51.62½	51.87½	49.87½
Zinc, East St. Louis	**5.25**	5.05	5.05	4.85
Zinc, New York	**5.62½**	5.42½	5.42½	5.22½
Lead, St. Louis	**5.25**	5.05	5.05	4.35
Lead, New York	**5.50**	5.20	5.20	4.50
Antimony (Asiatic), N. Y.	12.62½	12.62½	12.50	14.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Dec. 15, 1936	2.274c. a Lb.	$19.73 a Gross Ton	$17.33 a Gross Ton
One week ago	2.274c.	19.73	16.50
One month ago	2.197c.	18.73	16.17
One year ago	2.130c.	18.84	13.33

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products represent 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1936	2.274c., Dec. 8	2.084c., Mar. 10	$19.73, Nov. 24	$18.73, Aug. 11	$17.33, Dec. 15	$12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

they will place even heavier tonnages before the end of the year.

Reinforcing Bars

Mills are still busy on clean-up orders and new orders are comparatively light. Several fair-sized jobs are pending which will probably be speeded up some after price announcements are made. No producers have officially announced their stand on first quarter prices, but the general opinion is that an increase is in prospect and will be announced before the end of the month, with a good possibility of the new prices becoming effective immediately.

Railroad Business

First quarter quotations on light rails are up $3 over current prices. Backlogs on standard rails assure the local rail mill a high operating rate all through the first quarter. The Bessemer & Lake Erie Railroad has placed an order for 10 Texas type freight locomotives and two eight-wheel switching engines while the Union Railroad has ordered four Union type heavy transfer locomotives.

Plates and Shapes

Bookings of plates and shapes are substantially higher than a month ago and it is expected that before the end of this month backlogs will be higher than at any time in several years. Price advance announcements have brought out many jobs which had been temporarily abandoned while plans for other projects have been speeded up considerably. Privately financed projects continue to increase compared with jobs financed by public funds. It is understood that an extension of the Pennsylvania Railroad's electrification program to cover Eastern Pennsylvania, will involve approximately 25,000 tons of plates and shapes. The American Bridge Co. will furnish 800 tons of fabricated material for a railroad bridge at Balcony Falls, Va.

Strip

Local strip producers are out of the market at fourth quarter prices. A tremendous amount of business is on the books and finishing mills will have to be scheduled at capacity in order to clear this material by the end of January. Some business has been taken at the new prices but the amount involved is small. Practically every user of strip steel has placed substantial bookings but by the time a large portion of this steel reaches the customers, it will go into immediate consumption. Aside from automotive interests, electrical appliance manufacturers and office furniture makers have specified extensively.

Tin Plate

Tin plate operations have climbed seven points to 96 per cent. Not only has there been a fair volume of general line can business, but packers specifications for 1937 packs have been coming in at a better rate. A considerable amount of tin mill black plate tonnage was placed previous to the price increase announcements. Practically all hot and cold mills are operating at capacity.

Sheets

Aggregate volume of sheet tonnage placed in the early part of December reached a total that is probably without precedent. Out of the market at old prices, makers are turning their attention to the herculean task of getting this material clear of the mills by the end of January. To do this, it will be necessary to maintain production at capacity during the rest of this month and all of January. Some business has been taken at the new prices but the amount involved is negligible.

Steel Sheet Piling

Awards have been light in the past week, although several large projects are pending and will probably be let before the end of the month. The Mississippi River dam No. 3 at Red Wing, Minn., involves 1300 tons of permanent piling. At the time the Navy Department received bids for steel piling for a bulkhead at Sewell's Point, Va., alternate bids were also furnished on the basis of a stone structure. Cost of the latter is substantially under the steel piling bids and the contract will probably be let on this basis.

Tubular Products

Without the impetus of higher prices for first quarter delivery, movement of tubular goods is progressing at a steady rate. Locomotive boiler tubing is especially active and there has been no change in the steady improvement in bookings of standard pipe. Pipe discounts have remained unchanged for several months and it is more than likely that higher prices will be announced some time during the first quarter.

Wire Products

Contrary to expectations, bookings of manufacturers' wire at the new prices have been in good volume. Consumption is at a high rate with automobile companies taking the lion's share. These orders, coming at a time when backlogs are exceptionally heavy, preclude any falling off in operations in the near future. Consumers of merchant wire items specified heavily before the price advance, and, as a result, orders at the higher prices are light. Although the quotations announced Dec. 1 are subject to change at any time, for all practical purposes they will represent first quarter prices. Should a price rise materialize early in the year, consumers will be able to anticipate their needs before the deadline.

Coal and Coke

The situation with regard to standard furnace coke is growing more serious. As the result of shortages, standard beehive furnace grade has moved up to $4 to $4.25 a ton, f.o.b. Connellsville, an increase of 15c. a ton and the second advance in two weeks. All beehive coke ovens capable of producing a good grade of furnace coke are now in operation, the only ovens left being those requiring large expenditures for rebuilding. One large steel company with its own by-product facilities has been inquiring for a tonnage of beehive furnace coke, but has found no one who can furnish it. Another steel producer is badly in need of coke which, if not obtained, might possibly result in a blast furnace being banked. Foundry beehive coke is stronger and has advanced 25c. a ton to $4.50 a ton, f.o.b. Connellsville.

Wholesale Prices For Week of Dec. 5

ANOTHER advance marked the trend of wholesale commodity prices during the week ended Dec. 5, according to an announcement made by the Bureau of Labor Statistics, U. S. Department of Labor.

With a rise of 0.5 per cent for the week, the index has shown an advance in each of the past six weeks and now stands at 83.0 per cent of the 1926 average, the level for October, 1930. Since the fourth week in October, wholesale prices show a cumulative increase of 2.3 per cent. The current level is 6.3 per cent above the low of this year, which was reached during the week ended May 16.

Eight of the 10 major groups used by the bureau in classifying wholesale commodity prices rose above the level of the preceding week and two—fuel and lighting materials and miscellaneous commodities—showed no change. The largest increase was registered by the farm products group, which advanced 1.4 per cent over the preceding week.

. . . . CHICAGO . . . .

. . . Ingot output at practical capacity with 77½ per cent of furnaces operating.

o o o

. . . Railroad equipment market still active, with 18,000 cars or more pending.

o o o

. . . Structural steel demand improved; scrap prices advance up to $2 a ton.

CHICAGO, Dec. 15.—Ingot output at 77½ per cent of capacity appears to have reached its top, not because of slackening of demand, but for the reasons that mills are close to the limit of their ability to produce raw steel and because of the character of consumers' wants. This situation is causing some little concern to those units which find that their production ceiling under present conditions is less than 100 per cent of practical rating as computed for previous stresses of high demand. The distribution of available raw steel is the main determining factor governing rail rolling which is and may remain at about 50 per cent of capacity.

New purchases of finished steel products remain on a spot basis, forward contracting not being as important as might be expected at this time of the year. Specifications are heavy and point to no recession of the rate at which consumers will take their needs. Books, now loaded with rail tonnages along with other products, are the heaviest of the year and deliveries extend well through February on many of the light products.

The railroad equipment market is fulfilling all that it promised, and more inquiries are expected before expiration of the price protection period. A total of 18,000 cars or more is still to be acted upon.

Scrap prices are again advancing and the pace is the fastest in many a year, advances as high as $2 a ton being added within a week's time. There is promise of a better general plate business and structural steel demand is climbing as buyers rush into the market to take advantage of price protection on identified projects.

Pig Iron

New buying is of little consequence, but shipments are heavy and the movement will extend without change through the holiday period. Automobile foundries are close to capacity output and the melt in agricultural implement foundries has climbed to a winter peak. Stove, furnace and radiator units all report gains in business.

Warehouse Business

Old price lists are being maintained and there is no intimation of advances to conform with new mill quotations. December business is excellent, being level with that of November, which may eventually bring this month to a position among the best of the year. On the other hand, the holiday trade can be, and usually is, quite slow. All warehouse commodities are moving and stocks are comfortable considering the mill delivery situation.

Reinforcing Bars

This market is completely demoralized as to prices. Cuts of $4 to $6 a ton are mild and the size of the order is no longer a determining factor as to where price cutting should stop. This situation exists at a time when fabricators are expecting mill advances of $3 a ton. Fabricators' books are already filled, shops are busy and deliveries are delayed. Low-priced tonnages taken now mean that it may be months before shops can profit by price stabilization even if made in the very near future. Inquiries are turning upward and some attractive tonnage business has been placed within the past week.

Sheets

Forward contracting is lacking, but spot buying is excellent. There is nothing to be had at the old prices and the best deliveries that are available are for February, with books well filled for that month. There is no indication of a drop in automobile demand and agricultural implement manufacturers have returned to their high summer rates of production.

Wire Products

The operating rate has been pushed up several points to 77 per cent of capacity, which appears to be about all that wire mills can do based on the character of orders and the distribution of raw steel. There is a fast flow of manufacturers' products, and nails and barbed wire are moving better as distributers start to stock for spring deliveries. The over-sold condition of British and German mills is helping American steel makers to regain the South American trade, where prices have already shown advances up to $9 a ton. The strong tendency to hold steel in Europe is expected to improve market conditions along the Eastern and Southern American seaboard.

Cold-Rolled Strip

Sheet mills are so busy that they are giving little attention to slitting, with the result that a much heavier volume of business is flowing to cold-rolled strip mills. Promises are now extended to March for practically all widths.

Rails

Mill books are astonishingly heavy as the result of the rail tonnages taken prior to price advances. The Grand Trunk Western has placed 5000 tons, of which Inland took 1500 tons and Carnegie-Illinois the remainder. Deliveries on all of the above tonnage will be spread over the next four months. Therefore, with raw material in exceptional demand, rail mill rates will not be pitched high. The rate of production in the Chicago district is about 50 per cent of capacity and it may not go higher.

Bars

Only a few scattered sizes, and those not in large tonnages, are now to be had from mills at the old prices. Pressure for consumer needs is coming from all directions

and there is no let-up in sight over the holiday period. Automobile plants give no indication of recession of activity, and farm implement manufacturers have reached the high mid-summer rate of production, while some units have reached above that peak. Tractor plants report excellent demand and production has been lifted to a high for the early winter.

Plates

Added to the general run of business, which has been growing of late, there is now a liberal flow of railroad car material. Plates for dams across the Mississippi River are also in good demand. Steel sellers count not less than 18,000 cars that are on inquiry and new requests for prices are expected before the protection period expires. Quotations will be terminated at the end of this month. Eight barges, requiring 1500 tons, will be ordered at Kansas City, Kan., and a pipe line in the Northwest will take 3000 tons.

Structural Material

Approach of the end of the protection period on identified projects is driving many jobs into the market and the entire structural outlook is improved. In the past 10 days over 225 jobs have come to light, though almost 200 of these are small. Bethlehem has taken the 3500 tons needed for the Le Claire, Iowa, dam. On Jan. 19 bids will be taken on the New Boston, Ill., dam, which will require 3000 tons.

New bids will be called Feb. 3 for the construction of the Pearl Harbor, T. H., drydock on which all bids were rejected two weeks ago. Steel tonnage estimates have been raised from the early 30,000 ton aggregate to nearly 40,000 tons. This includes approximately 29,000 tons of steel plates and 8500 tons of structural steel.

An award of 500 tons of structural steel for the I Street viaduct in Sacramento was the largest of the week. Totals were small with only 917 tons of shapes and 814 tons of reinforcing bars awarded. Mill operations have remained fairly active with the influx of orders caused by announced price increases.

. . . Sheet bookings are extremely heavy.

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. . . Sales made for January at new prices.

CINCINNATI, Dec. 14. — Recent inquiries of district sheet users for immediate tonnages at January prices reveal the failure of some consumers to specify fully before books closed. The situation gives rise to speculation upon the actual amount of sheets needed to cover current requirements. With mills refusing new business for current delivery and with rolling schedules booked almost to the end of January, the stringency assumes disturbing proportions. Announcement by an Indiana auto manufacturer of sheet coverage for five months in advance, has caused a slight flurry among some consumers that favoritism has been shown in bookings. This, however, was promptly denied by mill interests, who pointed out that books were kept open as long as mill capacities permitted. Mill operations are at full capacity and all interests seek to speed deliveries.

Open-hearth operations remain at about 92 per cent, 31 out of 34 furnaces being in operation.

Scattered reports of further price increases in pig iron the past week failed to unsettle the district market. While furnace representatives would welcome any stimulus to buying, they indicate that nearby advances in quotations are not likely. Current buying has lapsed into a steady dribble of spot orders to cover urgencies. Requisitions against contracts, however, are heavy and shipments tend upward. Foundry operations are steady at about 80 per cent of capacity. Most melters are running five to six heats a week, but a few are holding at three. Scarcity of skilled molders is reported to be a deterrent to further increase in the melt.

. . . Southern Pacific equipment orders feature market.

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. . . 4300 tons of steel awarded for Bridge Railway.

SAN FRANCISCO, Dec. 14.— Railroad buying dominated the market last week principally because there was no other activity. Southern Pacific continued its expansion program with the awarding of contracts for $16,500,000 worth of equipment, including 2725 freight cars, 28 locomotives, 41 passenger cars, and the rebuilding

Union Wire Rope Corp., Kansas City, has appointed Wendrick Steel Products Co., 53 West Jackson Boulevard, Chicago, as distributer in Illinois, Wisconsin and northern Indiana.

Towmotor, Inc., Cleveland, manufacturers of gasoline powered materials handling equipment, has appointed Henry M. Wood Co., 800 Times-Star Building, Cincinnati, as representative for southern Ohio and Indiana, northern Kentucky, and northwestern West Virginia.

Atlantic Brass & Copper Co., New York, has moved to 140 Grand Street.

Shafer Bearing Corp., Chicago, has moved to 35 East Wacker Drive.

Crucible Steel Co. of Canada, Ltd., Toronto, has appointed as Canadian distributers, Railway & Power Engineering Corp., Ltd., Toronto. Warehouses are located at Montreal, Toronto, Hamilton, Winnipeg, Vancouver, Sydney, N. S., and New Glasgow, N. S.

Warner & Swasey Co., Cleveland, machine tool builder, has removed its Milwaukee office to the Wells Building, 324 East Wisconsin Avenue, that city. F. J. Pelich is district sales manager.

Defiance Pressed Steel Co., Defiance, Ohio, has removed its factory and offices to Marion, Ohio, at Cheney and Ohio Streets.

. . PHILADELPHIA . .

. . . Mills trying to dispose of low-priced tonnage by Jan. 31.

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. . . Many last minute requests for coverage are being rejected.

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. . . Operating rate unchanged at 54½ per cent of capacity.

PHILADELPHIA, Dec. 15.—The flood of orders which has been inundating sales offices over the past two weeks has abated somewhat, but the present volume is still of good size. Sellers have taken very few orders at the new prices as yet, but a number of quotations at first quarter prices have been made, and the inquiries which are being received daily indicate that operations during February and March will continue at a high rate. Much of the business being taken at first quarter prices is tonnage turned down by sales offices when it was presented for coverage at the lower prices because of inability to ship within the time limit.

Floor plates have been increased $3 per ton for first quarter shipment, while ferromanganese was advanced $5 per ton.

The strike at the plant of the Sun Shipbuilding Co., Chester, Pa., which last week assumed serious proportions, was proceeding peacefully Monday afternoon, according to a statement by R. L. Burke, general manager. Mr. Burke said that when the plant opened Monday morning, peaceful picketing was in process, but about 65 per cent of the employees who desired to work were allowed to enter the plant unmolested and without disorder. Although every section of the plant was affected by the strike to some extent, Mr. Burke pointed out that men were working in every department, thus allowing production to continue. No predictions as to the duration of the strike or of its effect on the company's business were made.

Steel plant operations are unchanged at 54½ per cent of capacity.

Increasingly bullish sentiment in the scrap market was reflected by advances throughout the list, with No. 1 steel now being quoted from $15.50 to $16, up 50c. a ton.

Pig Iron

District pig iron production will be increased next week by the return to blast of the large Alan Wood Steel Co. furnace at Swedeland, Pa. The reasons for this move are that regular customers who are covered are demanding heavier shipments on their contracts, and the expectation of a sizable increase in spot business. Current orders are fairly numerous, but they rarely exceed a few carloads.

Plates, Sheets and Tin Plate

Orders for delivery before the end of the year are still being taken in plates by nearly all sales offices. Railroads are being allowed coverage for their requirements other than for miscellaneous repair work, even when delivery will not be made until well into the quarter. Baldwin Locomotive Works was awarded four Union Railroad engines last week and now has on hand orders for 132 steam locomotives and 41 extra tenders. It is almost certain that all of the sheet tonnage taken at fourth quarter prices cannot be shipped by Jan. 31. Speculative buying seems to have been heavier in sheets than in any other product, but sellers do not look for much of a slump in buying next quarter.

Warehouse Business

Finished steel price advances are reflected in upward revisions of warehouse prices on galvanized and hot-rolled annealed sheets, each being marked up 30c. per 100 lb., effective today. Other price changes for first quarter buying will be announced next week. Business in November was behind that of October, and that received thus far this month has not been quite up to the November totals. At least one warehouse, however, expects a sufficient increase in business the last half of December to place the month on a par with November.

Shapes

A building for Howard University in Washington, requiring 750 tons of shapes, was awarded to Lehigh Structural Steel. An Atlas Powder Co. building at Wilmington, taking about 250 tons, was awarded to American Bridge Co. Bids will be taken Dec. 22 for a building in Washington which will need from 2500 to 3000 tons of shapes, and a highway bridge in Maryland requiring 1600 tons is up for bids today.

Imports

The following iron and steel imports were received here last week: 1176 tons of pig iron from British India; 31 tons of steel billets, 20 tons of steel tubes, 18 tons of steel bars, and 24 tons of steel forgings from Sweden.

B. & W. to Reopen Bayonne Plant

A LARGE volume of business has made it necessary for Babcock & Wilcox Co., 85 Liberty Street, New York, to reopen for assembly purposes part of its Bayonne, N. J., plant, which has been closed since about November, 1932. Approximately one-half the machine shop is being utilized for assembling, and employment will be provided for about 150 men. Actual operations will probably not begin until early in February. No plans have been made for opening additional sections of the plant, but in the event of continued good business, such a move would not be improbable, according to a company spokesman.

RAILROAD BUYING

Bessemer & Lake Erie has placed an order for 10 Texas type freight locomotives and two eight-wheel switching engines, with American Locomotive Co.

Union Railroad has ordered four Union type heavy transfer locomotives from Baldwin Locomotive Works.

The Pennsylvania will purchase 2500 freight cars. This railroad will ask bids until Dec. 21 for steel axles, steel tires, etc. (Contract 12-1936).

The Erie is in the market for 750 box cars, 500 automobile cars and 250 gondola cars.

Illinois Central will purchase 1000 box cars, 500 coal cars and 500 hopper cars.

Missouri-Kansas-Texas is in the market for 500 gondola cars, 500 stock cars and 150 automobile cars.

Burlington Refrigerator Express is inquiring for 300 cars.

Denver & Rio Grande Western will buy 100 ballast cars.

Chesapeake & Ohio has ordered 500 hopper cars from Standard Car Mfg. Co.; 500 box cars from General American Transportation Co.; 500 hopper coal cars and 500 steel gondola cars from American Car & Foundry Co.

Southern Pacific has placed 14 locomotives each with Baldwin Locomotive Works and Lima Locomotive Works, and has ordered 825 automobile cars from General American Car Co. and 350 from Mount Vernon Car Co.

Chicago & North Western is inquiring for 500 50-ton automobile cars, and 23 coaches and 150 ballast cars.

Baltimore & Ohio is inquiring for 1500 gondola cars.

Delaware & Hudson will build 60 55-ton hopper cars, and may build later 100 40-ton box cars in its own shops.

New Haven will build 150 low side coal cars at its Readville, Mass., shops and will purchase 75 additional flat cars.

Western Pacific has ordered 50 50-ton flat cars from Pacific Car & Foundry Co.

Richmond, Fredericksburg & Potomac is inquiring for six baggage-express cars.

Central of Georgia may buy five passenger cars and two express cars.

Gulf, Mobile & Northern has ordered one high speed, light weight, streamlined, power-mail-baggage car and two light weight, streamlined trailer coaches and 37 passenger cars from American Car & Foundry Co.

Baldwin Locomotive Works has on hand orders for 136 steam locomotives and 41 extra tenders. Dollar value of orders taken in November by the company and its subsidiaries, including Midvale Co., was $8,876,849 as compared with $2,311,739 in November, 1935. Consolidated unfilled orders on hand Nov. 30, 1936, amounted to $21,664,198 as compared with $6,689,081 on Jan. 1, 1936, and $6,739,683 on Nov. 30, 1935.

Missouri Pacific will buy 2000 box cars, 2000 gondola cars, 50 hopper cars and 25 cabooses. This railroad has also been authorized to expend $83,160 for parts to modify Evans automobile loading devices on 297 cars previously equipped with this device.

Shreveport Railways Co. has purchased 12 trackless trolleys from J. G. Brill Co.

Western Maryland is seeking authority to issue $1,590,000 in equipment trust certificates to apply on purchase of 100 all-steel automobile box cars, 500 50-ton box cars and 150 50-ton gondola cars, to be built by Bethlehem Steel Co. at its Johnstown, Pa., plant.

New York Central has inaugurated a large car repair program at its own shops.

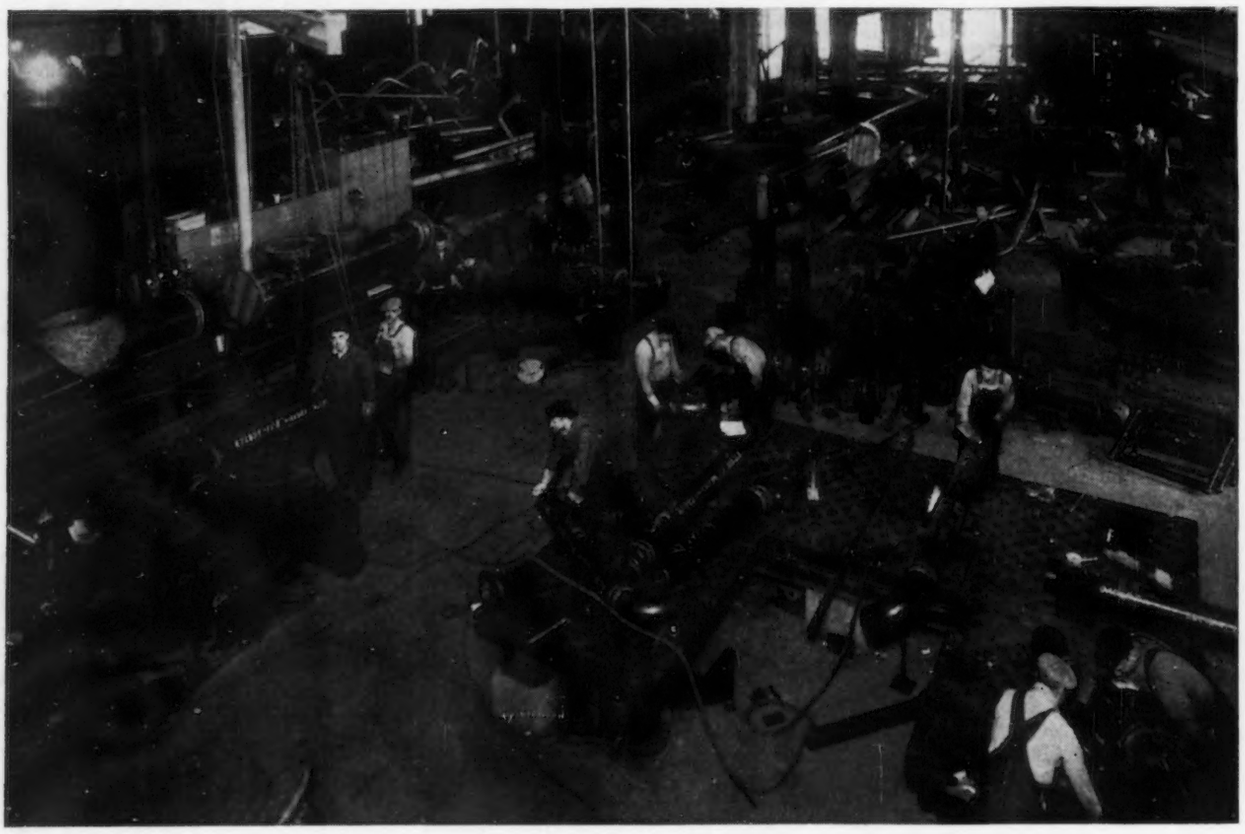
RAILS AND TRACK SUPPLIES

Tennessee Central has ordered 3000 tons of rails.

Bethlehem Steel Co. has been awarded 650 tons of 90-lb. rails, 1425 tons of contact rails, and 375 tons of spikes and bolts for San Francisco-Oakland Bay bridge railway.

Columbia Steel Co. has received an order for 500 tons of 90-lb. rails and 780 tons of tie plates for San Francisco-Oakland Bay bridge railway.

Grand Trunk Western has ordered 1500 tons of rails from Inland Steel Co. and 3500 tons from Carnegie-Illinois Steel Corp.



WELDING department of one of the pioneers of prefabricated piping materials, the Midwest Piping & Supply Co., Inc., St. Louis, which was host to more than 200 members and guests of the International Acetylene Association during the recent convention of the I.A.A. at St. Louis. In addition to the fabrication of large and small pipe assemblies, the production line set-up for the manufacture of welding fittings was to be seen. A wide variety of materials, including stainless, chrome and other alloy steels, and non-ferrous metals are regularly welded. Welding equipment is of all types, including atomic hydrogen, and work-holding fixtures, many of them unique, and work positioning devices are extensively employed.

. . . CLEVELAND . . .

. . . Ingot output is two points higher at Youngstown.

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. . . Sheet and strip mills crowded to capacity through January.

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. . . Sheet orders for February shipment taken at new prices.

CLEVELAND, Dec. 15.—Ingot output in the Youngstown district advanced two points to 80 per cent of capacity this week. In the Cleveland-Lorain district the rate is unchanged at 76 per cent of capacity. A blast furnace has been taken off in Lorain for relining.

Finishing mills, particularly sheet and strip mills, are being crowded to capacity to get their order books cleaned up by Jan. 31 of tonnage taken at the fourth quarter prices. Consumers continue to place considerable finished steel in products that are still available at fourth quarter prices. However, mills have generally adopted the policy of taking no orders that they cannot ship by Jan. 31. Producers have orders for all the tonnage of some products they can fill next month. Before entering orders some sales offices are submitting inquiries to their mills to ascertain whether there is still room on the rolling schedules to get out the steel in January.

With January rolling schedules filled, sheet mills are out of the market for orders for delivery next month, and the same is true of cold-rolled strip. Some producers are in the same situation on hot strip, but others still have a little tonnage available for January shipment. Mills have accumulated good backlogs in plates and shapes, but can still take orders for January shipment at the fourth quarter prices. Buying of sheets has got under way in good volume at the advanced prices for February shipment. Consumers are anxious to get on the rolling schedules in order to have the steel when needed and the new prices are bringing no resistance from buyers.

Motor car manufacturers during the week placed sizable orders for sheets for February delivery and additional purchases in large lots are pending from that industry.

Scrap prices, which have been nominal for several weeks in the Cleveland and Youngstown districts in the absence of consumer buying, have advanced 75c. on steel-making grades in Youngstown with a purchase of a round tonnage by one consumer, and are also being marked up in Cleveland.

Pig Iron

Sales for the first quarter at the $1 a ton advance in price are exceeding in volume the expectations of producers. Lots up to 1000 tons have been sold. Some car lot orders for December shipment have been placed by small foundries that buy iron only as needed. Shipments against last quarter contracts continue heavy, particularly to automotive foundries and the amount of iron on the furnace books will be sharply reduced by Jan. 1.

Sheets

With consumers placing business for February rolling in order to secure shipments when they need the material, the volume of business in sheets at the new prices is surprisingly heavy in all grades. Some mills report that orders are being placed at about 75 per cent of the heavy November volume. Considerable tonnage was placed by the motor car manufacturers during the week and large purchases are pending from that industry and are expected to be placed later this week. No deliveries against these new orders are being promised before February. Mills are being crowded to capacity and are able to take care of early needs of their customers who made purchases some time ago, but there is some pressure to have deliveries advanced from February to January. Sheet seconds have become very scarce and with recent advances and with the present tendency upward all grades of seconds are expected to be $4 a ton higher by Jan. 1 than they were during the third quarter. This will mean that mills will be able to get the advantage of higher prices on seconds before the advanced prices on primes become effective.

Strip Steel

Mills are taking no more orders for cold strip at the old prices, having sold all the cold material they can roll during January. While one or two mills have not yet withdrawn from the market on hot strip, there is little of that material available at the old price. New demand slowed down the past week, although some business is being placed at the advanced prices for the first quarter.

Bars, Plates and Shapes

The rush to get bar tonnage on the mill books at the fourth quarter prices has subsided somewhat, but the volume of business is still good. Makers are accepting at the old prices only orders that they can ship by Jan. 31 and several are filled up for January on many sizes. Some can take only large sizes. Demand for plates is good and structural shapes are moving fairly well. Mills are still selling these products at the fourth quarter prices, being able to make shipments in three to four weeks.

Republic Steel Corp. has placed 12,000 tons of structural shapes for its strip steel mill buildings in Cleveland with the Bethlehem Steel Co. A grade crossing elimination bridge in Millbury, Ohio, requiring 480 tons, has been placed with the Duffin Iron Works. Bids were opened today for a similar project in Lorain County requiring 700 tons.

....BUFFALO....

...Contracts awarded for several large jobs.

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...Steel plant operations are unchanged.

BUFFALO, Dec. 15.—With the awarding of the general contracts on several important jobs within the past week, structural fabricators are keenly interested in the steel bidding. Bryant & Detweiler of Detroit will have the contract for the pumphouse, screening and grit chamber, sedimentation chamber of the Buffalo sewage disposal plant on Bird Island, a job running about 1500 tons of steel, mostly reinforcing. Bates & Rogers Construction Co., New York City, has the general contract for a 1200-ton grade crossing elimination at Little Falls, N. Y., and Foley Brothers, Inc., New York City, has the general contract on the first section of the Transit Road grade crossing job at Depew, N. Y., to run about 400 tons of steel for the first section and about 1200 tons in all. A Buffalo concern will fabricate 140 tons for an addition to the National Aniline & Chemical Co. plant.

Open-hearth operation in Buffalo is the same as last week with Bethlehem's Lackawanna plant maintaining 22 active furnaces; Republic, 7 and Wickwire-Spencer Steel Co., 2.

Changes in steel warehouse prices scheduled to come through last week have not materialized.

....ST. LOUIS....

...Steel buying still in good volume.

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...Pig iron shipments heavy this month.

ST. LOUIS, Dec. 15. — Mills are sold up on sheets and wire products for delivery at the prices prevailing before the recent advances, but orders for other items are being received in heavy volume. Structural shapes are in light demand, however. Railroads are specifying against fourth quarter contracts on sheets, shapes and bars.

The Sheffield Steel Corp. has been awarded 400 tons of reinforcing bars for a viaduct in St. Louis. A highway bridge in Benton County, Mo., requiring 575 tons of structural steel has been awarded to Vincennes Bridge Co.

The Missouri Pacific Railroad has been authorized by Federal Court to purchase and install parts necessary to modify Evans automobile loading devices on 297 cars previously equipped with this device, at an estimated cost of $83,160.

The advance of $5 a ton in the price of ferro-manganese has stimulated heavy buying by local interests.

Most pig iron melters in the St. Louis area, having previously ordered enough pig iron for their requirements for the remainder of 1936 and well into the first quarter of 1937, buying was light during the week. Shipments continue heavy, however.

...BOSTON...

...Some pig iron sales at $22.75 Everett.

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...New England industries extremely busy.

BOSTON, Dec. 15.—Limited sales of pig iron for first quarter delivery on a basis of $22.75 a ton, f.o.b. Everett, for No. 2 foundry are reported, but as consumers are taking fourth quarter iron freely and generally are covered well into first quarter, no open inquiries for 1937 iron are coming into market. Foundries in a large majority of cases report increased bookings of castings, in many instances at advanced prices. Indications are the December foundry melt will be 5 to 10 per cent larger than that of November.

All New England steel mills are operating at capacity and are well booked ahead. The General Electric Co. and Westinghouse Electric & Mfg. Co. plants in this district are busier than they have been in years. The General Electric Co., Lynn, Mass., works now employs more than 7900, or 2200 higher than on Jan. 2, last. The average wage is 10 per cent above 1929.

..CAST IRON PIPE..

Swanton, Vt., has awarded 14,000 ft. of class 150 pipe to United States Pipe & Foundry Co.

LeRoy, Kan., closes bids Dec. 23 for 24,790 ft. of 2 to 8-in. for water system; also for about 10,000 lb. cast iron specials and 50,000-gal. elevated steel tank on 100-ft. steel tower. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Cherokee, Ala., plans about 23,000 ft. for water system; also 100,000-gal. elevated steel tank and tower and pumping station. Fund of $34,500 has been secured through Federal aid.

Water Division, City Hall, Buffalo, plans pipe lines for water system, including extensions in present lines and replacement of several existing mains; also extensions and improvements in municipal filtration plant and two pumping stations. Entire project will cost about $960,000. A. D. Drake is director of division.

Grass Lake, Mich., will ask bids soon for pipe for water system and other waterworks installation. Ayres, Lewis, Norris & May, Ann Arbor, Mich., are consulting engineers.

Britt, Iowa, closes bids Dec. 28 for about 7000 ft. of 4 and 8-in. for water system; also for 100,000-gal. elevated steel tank on 100-ft. steel tower and pumping station. Currie Engineering Co., Webster City, Iowa, is consulting engineer.

Mammoth Springs, Ark., closes bids Dec. 22 for pipe for water system; also for elevated steel tank and tower and pumping station. Fund of $36,365 has been secured through Federal aid. Hugh R. Carter, National Standard Building, Little Rock, Ark., is consulting engineer.

Nashua, Mont., closes bids Dec. 19 for 17,975 ft. of 2 to 8-in. for water system; also for about 4000 lb. special cast iron fittings, two 350-gal. per min. turbine pumping units with accessories, and concrete reservoir. John W. Hall, Great Falls, Mont., is consulting engineer.

Chadron, Neb., is arranging bond issue of $60,000, to which will be added Federal grant of $40,909, for pipe lines for water system, replacing all existing wooden mains.

Longford, Kan., plans pipe lines for water system; also elevated steel tank and tower, pumping station and other waterworks installation. Cost about $36,500. Paulette & Wilson, Farmers' Union Building, Salina, Kan., and National Reserve Building, Topeka, Kan., are consulting engineers.

Newnan, Ga., asks bids until Jan. 8 for 6800 ft. of 12-in. for trunk water main; also for 1500-gal. per min. centrifugal pumping unit and auxiliary equipment. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

Safford, Ariz., has awarded 567 tons of 2 to 10-in. for a water supply line to Pacific States Cast Iron Pipe Co.

Los Angeles will open bids Dec. 21 on 105 tons of 20-in. pipe for Department of Water and Power.

Oakland, Cal., will open bids Dec. 23 on 128 tons of 6-in. for East Bay municipal district project.

. . . . NEW YORK. . . .

. . . Buying of steel lighter but still in good volume.

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. . . Mills now covering customers on identified projects.

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. . . New York Central inaugurates large car repair program.

NEW YORK, Dec. 15.—After the flood of orders received in late November and early December, the local steel trade has experienced what may, by comparison, be termed a lull, although the incoming volume of business would still be considered good by all normal comparisons. Steel sales departments are amazed by sales records that are virtually without precedent. One large company, for example, booked more business within two weeks than in any comparable period in its history, not excluding war time and unusually active years such as 1920 and 1929.

Books having been closed a week or two ago on sheets and strip at the fourth quarter prices, some mills are now restricting purchases of bars, though there is still some opportunity to place orders at the old prices for shipment before the end of January. In plates and shapes there are open spaces on mill schedules and orders can be placed for shipment within the same period without paying the increased price. Bookings in sheets and strip are so heavy with some companies that doubt exists as to their ability to clean up these tonnages by Jan. 31, as has been their aim. It appears that some companies have been more liberal in the acceptance of low-priced tonnage than others.

A significant feature of the business now on mill books is that virtually all of it consists of specific orders as differentiated from requirements' contracts that have been a common feature heretofore in anticipation of a price advance.

The principal business of the steel companies the past week was in the field of identified construction projects, including railroad equipment. Car and locomotive building companies have covered for a large amount of steel and probably more is to come. Many building projects are also coming to life so that coverages may be obtained before the Dec. 31 deadline on such protection. A few companies are restricting coverages on building jobs where it appears likely that the steel will not be required for some months.

Merchant pipe is the outstanding major product that has shown no marked pickup; on the contrary, the movement of pipe out of jobbers' warehouses is at very low ebb. There was no price advance to stimulate pipe demand, but another important factor is that the volume of current building work is seasonally light.

Apparently no decision has been reached by any of the mills as to whether there shall be a price increase on reinforcing bars, though there is talk of a $4 a ton rise. Light rails have been raised $3 a ton to $38, Pittsburgh.

The New York Central System has embarked upon a large car repair program in its own shops.

Pig Iron

New business is in light volume, but demand has dropped off less than expected. All sales are now being based on the $1 a ton higher price which became general on Nov. 24. The additional $1.25 a ton increase made by Mystic stack at Everett, Mass., on Dec. 1 has not stimulated further action by other furnaces, but has served to strengthen the market's undertone appreciably. Nearby foundries are taking deliveries in volume, and probably 90 per cent of the establishments in this area are working six days a week. As a consequence of the stronger domestic market, Royal Dutch iron has tended upward in price. Bethlehem Steel Co. submitted the low bid on the Midtown-Hudson tunnel contract for cast iron segments. On 42,000 tons of regular segments the company's bid amounted to $2,345,700, or $55.85 a ton. On 5700 tons of special cast iron tapered segments, its bid price was $363,956, or $63.85 a ton. For the new Midtown-Queens tunnel under the East River approximately 55,000 tons of cast iron segments will be required, and bids on this business are scheduled for Dec. 23.

Reinforcing Steel

The reinforcing bar market presents a paradoxical situation this week in that distributers are talking about price increases for first quarter and price cutting from day to day at the same time. It is general belief that the next week or two will bring a price announcement, and some of the larger jobbers in this area are reported to have already given notice to their customers that present price schedules on bars will not be effective after Dec. 31. Meanwhile it is heard that shading of from $6 to $10 a ton is still in existence. An award of about 1200 tons of bars is expected soon by the contractors of the proposed Campbell Soup Co. building in Camden, N. J. Concrete Steel Co., New York, figured prominently in the week's awards, taking 1270 tons of the 1370 tons reported.

Steel is being used for the construction of fishing trawlers, which usually have been of wood. The Greyhound Trawling Co., Boston, has had built by the Russell Erie Basin Shipyard, Inc., Brooklyn, the first of a fleet of new-type boats. The hull is of wrought iron and within the hull is a shell of nickel-clad steel for the fish hold.

Continental Can Co., Inc., New York, has purchased a 45-acre plot in Tampa, Fla., as a site for a new can manufacturing plant, construction of which will be started shortly. Total floor area will approximate 70,000 sq. ft. and total cost with equipment is estimated at $500,000.

. . BIRMINGHAM . .

. . . New business lighter but backlogs are heavy.

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. . . Operations continue at unchanged rate.

BIRMINGHAM, Dec. 15. — Although new steel tonnage has been light since Dec. 1, business already booked is sufficient to maintain production at a high point for the next month or so. In fact, shipments against November orders will be permitted all through January. Not much new tonnage is expected for several weeks. November business was one of the best in the last six years and backlogs are also on the same basis. Furnace operations are the highest since July, 1930, and open-hearth the highest, with the exception of four periods, since the first quarter of 1931.

There is no change in the number of blast furnaces and open hearths. Fifteen blast furnaces and 16 open hearths are in operation.

Christmas and the year-end shutdowns will be brief in most cases as the mills will have to operate on full schedule as much as possible.

The outlook for the first quarter is exceedingly bright, as additional business is in early prospect.

Birmingham Southern Railroad is expecting delivery soon of two of its new Diesel-electric locomotives. Ten were purchased, but it will be March 1 before all arrive. The Bessemer plant of the Pullman-Standard Car Mfg. Co. is now working on an order for 100 steel box cars. Twenty-five gondolas have also been ordered.

. . GREAT BRITAIN . .

. . . Pig iron buying is in large volume.

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. . . Steel deliveries are far in arrears.

LONDON, Dec. 15.—(*By Cable*) —The pig iron demand is unrelaxed and consumers are anxious to purchase six months ahead, but the makers are reluctant. Hematite is at a premium and an early official advance is expected.

As from Jan. 3 the weekly hours of English and Welsh blast furnace men will be reduced from 56 to 48 hr.

The November daily average steel output was 40,052 tons. This is a new high, but finished steel deliveries are still in arrears and a further increase is necessary. Big export orders have been booked and large inquiries are circulating. A shortage in semi-finished steel was avoided by large additional Continental imports, but a growing shortage there may entail curtailment of exports to the United Kingdom.

The International meeting of tin plate makers last week made no price alterations. The next full meeting will be early in January. Meanwhile sales continue at 6d. to 1s. premium, though business is quieter. The Welsh output quota was raised from 65 to 70 per cent of capacity, retroactive to Nov. 30.

The Continental iron and steel market is very active. Sales of semi-finished steel suspended and several other products have been rationed. The International meeting of tube makers agreed on a uniform price basis.

British home prices are unchanged. British and Continental general export prices have been raised 15s. on black sheets and 20s. on galvanized sheets. The International export price of ship plates was raised 15s. The Continental Cartel also raised prices on hoops, strip and wire rods.

The number of wage earners in the pump and pump equipment industry rose to 14,870 in 1935, the Bureau of the Census reports, an increase of 38.5 per cent over 1933, when 11,110 were employed. Aggregate value of products made was $86,073,518, an increase of 75.7 per cent over 1933. Wages paid in 1935 were $17,137,798 as compared to $10,379,492 paid in 1933.

REINFORCING STEEL

. . . Awards of 4775 tons —6210 tons in new projects.

AWARDS

Dutchess County, N. Y., 115 tons, bridge, to Concrete Steel Co.

Brooklyn, 100 tons, brewery building, F. & M. Schaefer Brewing Co., to Igoe Brothers.

Boston, 230 tons, New England Power Co. building, to Concrete Steel Co.

Lawrence, Mass., 225 tons, American Woolen Co. building, to Concrete Steel Co.

Lebanon, Pa., 450 tons, school, to Concrete Steel Co.

New York, 250 tons, section of Sixth Avenue, subway, to Concrete Steel Co.

Springfield, Mass., 250 tons, city requirements, to an unnamed firm.

Chicago, 800 tons, Calumet sewer, divided between Concrete Engineering Co. and Inland Steel Co.

Benton Harbor, Mich., 400 tons, House of David building, to an unnamed bidder.

Fort Wayne, Ind., 800 tons, reinforcing mesh and bars, to an unnamed bidder.

State of Illinois, 160 tons, buildings, to Calumet Steel Co.

St. Louis, 400 tons, viaduct, to Sheffield Steel Corp.

San Francisco, 119 tons, Alemany sewer project, to Soule Steel Co.

San Francisco, 134 tons, toll plaza on Golden Gate bridge, to Baird & Hilp Co.

Los Angeles, 104 tons, warehouse for Las Vegas Land and Water Co., to Blue Diamond Steel Corp.

Sacramento, Cal., 135 tons, I Street viaduct, to Palm Iron & Bridge Co.

Palo Alto, Cal., 100 tons, junior college, to Dunham-Carrigan Co.

NEW REINFORCING BAR PROJECTS

Camden, N. J., 1200 tons, Campbell Soup Co. building, steel award to be announced soon.

Boston, 665 tons, fish freezing and storage plant.

Manchester, N. H., 600 tons, bridge.

Hammond, Ind., 100 tons, auditorium.

Lafayette, Ind., tonnage being estimated, field house.

Royerton, Ind., tonnage being estimated, grade and high school.

Peoria, Ill., 200 tons, post office.

Dixon, Ill., tonnage being estimated, school.

Chicago, 2500 tons, water purification plant on South side.

New Boston, Ill., 600 tons, dam across Mississippi River.

Milwaukee, 140 tons, Shorewood branch post office; Thorp-Rogoff Co., 306 South Wabash Avenue, Chicago, general contractor.

Sacramento, Cal., 100 tons, buildings for air depot; bids opened.

Cheyenne, Wyo., 102 tons, three bridges in Crook and Sheridan counties; bids Dec. 17.

. . . British order airplanes to cost $1,000,000.

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. . . Steel business is fairly active.

TORONTO, Ont., Dec. 15. — Inquiries are beginning to appear for first quarter delivery, but booking for that period is slow. Vickers, Ltd., Maisonneuve, Que., has received orders for airplanes from Great Britain involving expenditure of $1,000,000, and other contracts are said to be pending both for this company and other steel concerns in Canada for war materials. Current demand from domestic consumers chiefly is for spot delivery and, while sales are somewhat below those of the previous several weeks, business is fairly active.

Most pig iron melters have sufficient iron on hand to carry them through the holiday period, and it is expected that buying on a more extensive scale will develop early in the new year. Production of pig iron is steady, with six stacks in blast. Prices are unchanged.

Trading in iron and steel scrap is tapering off. Shipments of heavy melting steel and other steel grades are being made to mills in the Hamilton and Montreal districts against contracts, and it is reported that a few new contracts have been closed recently. Canadian dealers, however, are not exporting scrap to Britain, but are sending some steel grades, including automobile scrap to the United States. Prices are unchanged.

Magnolia Pipe Line Co., Dallas, Tex., an interest of Magnolia Petroleum Co., same place, plans new 8-in. welded steel pipe line from tank farm and pumping station at Tilden, Tex., near Duval, Tex., oil field district, to terminal of parent company at Corpus Christi, Tex., about 85 miles, for crude oil transmission. Company will also make extensions in tank facilities at Tilden, including two new 80,000-bbl. steel tanks and auxiliary equipment. Cost over $750,000. Work is scheduled for completion in February.

St. Maries, Idaho, closes bids Dec. 21 for 44,840 ft. of 10 and 12-in., 8-gage steel pipe, and for 2500 ft. of 10-in. steel pipe, 3/16-in. plate, for trunk water system from intake dam at water source to municipal control station; also for valves, meters, fittings, etc. (Section 1), and for installation of such pipe (Section 2). Fund of $116,363 has been secured through Federal aid. Arthur Tiggelbeck, Sandpoint, Idaho, is consulting engineer; Walter Boberg is city clerk.

Vicksburg, Miss., has low bid from B. & M. Construction Co., Petroleum Building, Oklahoma City, Okla., at $189,157 for welded steel pipe from State-owned gas fields at Jackson, Miss., to city limits, for natural gas transmission for municipal service. Control and distributing station will be located at last noted place. Fund of $335,000 has been arranged, including steel pipe line distributing system. H. Lou Miller, Millsaps Buildings, Jackson, is consulting engineer.

Columbia Gas & Electric Corp., 61 Broadway, New York, through its subsidiary, Atlantic Seaboard Corp., plans welded steel pipe line from connection with present lines in Pennsylvania to Delaware State line, from which point extension will be continued to Wilmington, Del., city limits, in cooperation with Delaware Power & Light Co., Wilmington, for natural gas transmission. Contract has been made with Delaware company to furnish supply, to be distributed locally by that utility. Delaware company plans new steel pipe distribution mains in different parts of city; also control station and other operating facilities.

Moore Natural Gas Co., Brownwood, Tex., J. W. Moore, Lubbock, Tex., head, has secured franchise for furnishing natural gas at Lampasas, Goldwaithe and Lometa, Tex., and plans early construction of new welded steel pipe line from gas area near Brownwood to these points, where steel pipe line distributing systems will be installed.

World Economic Conditions

WORLD industrial production continued to advance during October, according to the monthly statement on foreign economic conditions made public by the National Industrial Conference Board. Increases in output in Canada, Netherlands, France, Germany, Norway, and the leading South American countries were sufficient to more than offset isolated declines in a few minor countries. Activity in the United States and Great Britain remained at about the same level as during the preceding month.

Industrial activity in Germany was well maintained during October. An intensive drive for raw material self-sufficiency within four years has been undertaken. The expansion necessary to carry out this program, however, may place a serious strain on the financial structure of the country. A renewal of attempts to enforce price control measures occurred during October, with the establishment of the office of Reich Commissioner for price supervision.

Reports from Great Britain indicate that the volume of activity is now about 8.5 per cent higher than the average 1935 level. Recovery is continuing on an increasingly broad front. Building activity, however, declined during September and October.

Improvement in France is based to a considerable extent on the desire to replenish low raw material stocks before their prices increase further. Building activity in France is the lowest in many years.

International trade advanced seasonally in September and reached 38.4 per cent of the 1929 average, according to the combined index of the value of trade in 75 countries, computed in terms of gold. The September figure compares with 36.4 per cent in the preceding month, and with 33.9 per cent in September, 1935. A part of the increase in value was due to higher unit prices of commodities, but there has also been a fair increase in the physical quantity of world trade.

British exports in October were the highest since November, 1930, and imports were the highest since November, 1931. French foreign trade rose to the highest level for 1936. Export activity in Italy has risen, and there is a possibility that import quotas will be advanced as increased foreign exchange becomes available.

Interesting Facts About the Railroads

TWENTY-FIVE railroads have repaid in full loans made to them by the Reconstruction Finance Corp.

Due to chemical treatment of water, many railroads now operate locomotives from 2000 to 6000 miles and in some cases as high as 10,000 miles before it is necessary to wash out the boilers, whereas some years ago it was the practice to do so after a run of from 200 to 800 miles.

A passenger locomotive uses from 70 to 120 gal. and a freight locomotive from 150 to 350 gal. of water per mile.

The total property investment as of Dec. 31, 1935, of Class I railroads in the United States was $25,714,360,000.

Through the increased efficiency in the use of fuel in the freight service, the railroads have saved nearly 220,000,000 tons of coal since 1922.

FABRICATED STEEL

. . . Lettings advance to 29,920 tons from 14,600 tons last week.

NORTH ATLANTIC STATES

Wallingford, Vt., 290 tons, Otter Creek bridge and overpass, to Bethlehem Steel Co.

Port Ivory, N. Y., 240 tons, warehouse, Procter & Gamble Co., to Joseph T. Ryerson & Son, Inc.

Northampton, Pa., 250 tons, Mary Immaculate Seminary, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

Blasdell, N. Y., 130 tons, New York Central grade crossing bridge, to American Bridge Co.

Garden City, N. Y., 185 tons, grade school, to Dreier Structural Steel.

Brewster, N. Y., 135 tons, office building, to Belmont Iron Works, Philadelphia.

Buffalo, 140 tons, National Aniline & Chemical Co. condenser house, to Ernst Iron Works, Inc., Buffalo.

Buffalo, 140 tons, Erie freight house, to R. S. McMannus Steel Construction Co., Buffalo.

Newark, 470 tons, Krueger grain building, to Bethlehem Steel Co.

Manville, N. J., 570 tons, Johns-Manville Corp., floor tile and shingle building, to Savery-Glaeser, Inc.

Portland, Pa., 140 tons, North Jersey Quarries, Inc., rock crushing plant, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

Chambersburg, Pa., 115 tons, Hershey creamery, to Lehigh Structural Steel Co., Allentown, Pa.

Pittsburgh, 260 tons, Prospect School, to Keystone Engineering Co., Pittsburgh.

Wilmington, Del., 250 tons, Atlas Powder Co. building, to American Bridge Co.

Baltimore, 1200 tons, machine shop, Crown Cork & Seal Co., to Bethlehem Steel Co.

Washington, 755 tons, Howard University building, to Lehigh Structural Steel Co.

SOUTH AND SOUTHWEST

Richmond, Va., 430 tons, American Suppliers Inc. building, to Bethlehem Steel Co.

Balcony Falls, Va., 812 tons, bridge, Chesapeake & Ohio Railroad, to American Bridge Co.

Allendale, S. C., 430 tons, Savannah River bridge, to Bethlehem Steel Co.

Kingsport, Tenn., 705 tons, mill buildings, Brunswick Pulp & Paper Co., to Bethlehem Steel Co.

Alcoa, Tenn., 225 tons, extension to building No. 623-B, Aluminum Co. of America, to Bethlehem Steel Co.

Harris County, Tex., 210 tons, underpass, to Bethlehem Steel Co.

Franklin County, Miss., 440 tons, bridge, to Nashville Bridge Co., Nashville, Tenn.

Madison, Miss., 110 tons, bridge, to Austin Brothers, Dallas, Tex.

CENTRAL STATES

Detroit, 400 tons, building, Bowen Products Co., to R. C. Mahon Co., Detroit.

Flint, Mich., 200 tons, foundry building, Motor Wheel Corp., to Flint Structural Steel Co., Flint.

Norwood, Ohio, 280 tons, two buildings for Hilton-Davis Chemical Co., to Ingalls Iron Works, Birmingham.

Kent, Ohio, 160 tons, office and factory, Twin Coach Co., to Burger Iron Co., Akron.

Cincinnati, 290 tons, building for Hilton-Davis Chemical Co., to Ingalls Iron Works Co.

Cleveland, 12,000 tons, strip sheet mill for Republic Steel Corp., to Bethlehem Steel Co.

Youngstown, 335 tons, annealing furnace for Youngstown Sheet & Tube Co., to Levinson Steel Co., Pittsburgh.

Youngstown, 2600 tons, mill building for Youngstown Sheet & Tube Co., to Fort Pitt Bridge Works Co., Pittsburgh.

Millbury, Ohio, 480 tons, Ottawa County bridge, to Duffin Iron Co., Chicago.

Milwaukee, 440 tons, Chase Avenue subway, to Fort Pitt Bridge Works Co.

Chicago, 200 tons, platform extensions, etc., Chicago Rapid Transit Co., to Hansell-Elcock Co., Chicago.

State of Illinois, 250 tons, bridge, to American Bridge Co.

State of Illinois, 700 tons, two bridges, to Worden-Allen Co., Detroit.

Sioux City, Iowa, 500 tons, bridge, to Haakinson & Batty.

Benton County, Mo., 575 tons, highway bridge, to Vincennes Bridge Co., Vincennes, Ind.

WESTERN STATES

Crook County, Wyo., 130 tons, State bridge, to an unnamed bidder.

San Francisco, 130 tons, Alemany sewer project, to Soule Steel Co.

San Francisco, 700 tons, pier shed, to Virginia Bridge Co., Roanoke, Va.

Sacramento, Cal., 500 tons, I Street viaduct, to Bethlehem Steel Co.

Los Angeles, 332 tons, sound stage for Twentieth Century Fox Film Corp., to Consolidated Steel Corp.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Springfield, Mass., 350 tons, city bridge.

Pepperell, Mass., 275 tons, Nashua River bridge.

Colonia, N. J., 550 tons, grade crossing elimination, Pennsylvania Railroad.

New York, 300 tons, Lilly Deche building, Realty Corp.

Maspeth, N. Y., 600 tons, shipping building National Can Co.

Brooklyn, 1500 tons, extension to power plant, Williamsburg Power Plant Corp.

Eddystone, Pa., 400 tons, sand beams and rod house, General Steel Castings Corp.

Buffalo, 1500 tons, structural shapes, steel piling and reinforcing bars, sewage disposal plant; Bryant & Detwiler, Detroit, general contractor.

Washington, 2500 tons, Apex building; bids Dec. 22.

SOUTH AND SOUTHWEST

Lexington, Ky., 1160 tons, University of Kentucky law, art and field buildings.

Louisville, Ky., 700 tons, glass plant.

Okmulgee County, Okla., 110 tons, highway bridge; bids taken Dec. 15.

CENTRAL STATES

Cincinnati, 200 tons, distribution house and garage, Western Electric Co.

Plymouth, Mich., 210 tons, factory building, Burroughs Adding Machine Co.

Monsanto, Ill., 300 tons, supports for turbine No. 6, Union Electric Light & Power Co.

Streator, Ill., 600 tons, factory and warehouse, Owens-Illinois Glass Co.

Hammond, Ind., 210 tons, building addition and tower, Lever Bros.

Muncie, Ind., 1830 tons, six bridges; bids Dec. 17.

Jefferson, Ind., 600 tons, field house.

New Boston, Ill., 3000 tons, dam across Mississippi River.

Peoria, Ill., 500 tons, post office; bids Jan. 8.

State of Illinois, 1110 tons, bridges.

State of Missouri, 880 tons, three bridges.

WESTERN STATES

Denver, 220 tons, Clear Creek bridge.

Denver, 209 tons, State highway construction; bids Dec. 17.

Hardin, Mont., 800 tons, sugar plant.

FABRICATED PLATES

AWARDS

Rockland, Mass., 250 tons, water tank, to Chicago Bridge & Iron Works, Chicago.

Harrisville, R. I., 100 tons, water tank, to Chicago Bridge & Iron Works.

Pittsburgh, 1692 tons, 10 coal barges for Campbell Transportation Co., to Bethlehem Steel Co.

Akron, Ohio, 120 tons, Service Supply Co., dredge pipe, to Treadwell Engineering Co., Easton, Pa.

Lemont, Ill., 575 tons, Globe Oil & Refining Co., three tanks, to Graver Tank & Mfg. Co., East Chicago, Ind.

Parco, Wyo., 205 tons, Sinclair Refining Co., 10 tanks, to Chicago Bridge & Iron Works.

San Francisco, 170 tons, University Mound Reservoir, to Western Pipe & Steel Co.

NEW PROJECTS

Kansas City, Kan., 1500 tons, eight barges.

SHEET PILING

NEW PROJECTS

New Boston, Ill., 2100 tons, dam across Mississippi River.

. . .NON-FERROUS. . .

. . . *Copper, zinc and lead stage sharp price advances.*

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. . . *Undertone in all metals still strong as buying continues.*

NEW YORK, Dec. 15.—On the strength of heavy consumer demands and influenced to some extent by a high foreign price level, the electrolytic copper market here on Monday moved up 50 points to a level of 11c. per lb., delivered Connecticut Valley, and 11.12½c. for Lake copper, delivered New York. Later on Monday, the foreign market moved up over £1 to 11c. a lb., c.i.f. usual Continental base ports, likewise on the strength of widespread demands abroad and also accentuated to some extent by the upward movement here. Although both markets are in a somewhat sensitive condition, no further significant price moves are looked for over the remainder of the week.

Zinc

The bullish domestic statistics and a price rise of £17 per ton in London last week are the underlying factors that forced prices here sharply upward over the past several days. A 10-point advance was established on Friday, followed by a similar advance on Monday, which fixed market values at 5.25c. a lb., East St. Louis, and 5.62½c., delivered New York. Even at these prices, it is evident that sellers are none too satisfied with their position; for surplus stocks have been entirely liquidated and scheduled production over the next several months is committed. Consequently, the metal still has a strong tone, and a further advance is anticipated in most quarters.

Lead

With consumption steadily on the upgrade and current demand eating into stocks, the market for lead during the week has been extremely active despite successive price advances. On Friday the New York price jumped to 5.30c., on Monday there was an additional $2 advance and on Tuesday prices again advanced $2 to 5.50c. a lb., New York. Even at this higher price, demand was so strong that sellers were unable even partially to take care of regular customers. Present indications are that November shipments, estimated at 54,000 tons, will reduce existing stocks sharply, and December shipments will probably effect even a greater decrease.

Tin

Following a lull in buying over the latter part of last week, sales volume spurted ahead on Monday as the New York price for Straits metal dropped to 51.85c. a lb. Some of this demand continued today even when the price advanced to 52.50c., with both plate mills and babbitt concerns interested in forward commitments. In the London market, spot and future Straits opened up on first call today at £233 10s., and the Eastern quotation was in the neighborhood of £234 15s.

Ingot Brass and Bronze

Prices received by members of the Non-Ferrous Ingot Metal Institute during the 28-day period ended Nov. 27 on commercial 80-10-10 and commercial 85-5-5-5 brass ingots were 11.741c. and 10.228c. a lb. respectively. Prices for the preceding period were lower at 11.044c. and 9.520c.

The Week's Prices. Cents Per Pound for Early Delivery

	Dec. 9	Dec. 10	Dec. 11	Dec. 12	Dec. 14	Dec. 15
Electrolytic copper, Conn.*	10.50	10.50	10.50	10.50	11.00	11.00
Lake copper, N. Y.	10.62½	10.62½	10.62½	10.62½	11.12½	11.12½
Straits tin, spot, New York	52.25	52.45	52.12½	....	51.85	52.50
Zinc, East St. Louis	5.05	5.05	5.15	5.15	5.25	5.25
Zinc, New York†	5.42½	5.42½	5.52½	5.52½	5.62½	5.62½
Lead, St. Louis	5.05	5.05	5.15	5.15	5.25	5.25
Lead, New York	5.20	5.20	5.30	5.30	5.40	5.50

* Delivered Connecticut Valley; price ¼c. lower delivered in New York.
† Includes emergency freight charge.
Aluminum, virgin 99 per cent plus 19.00c.-21.00c. a lb. delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 17.00c. a lb. delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.62½c. a lb., New York.
Quicksilver, $88.50 to $92.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 10.65c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	52.50c. to 53.50c.
Tin, bar	54.50c. to 55.50c.
Copper, Lake	11.50c. to 12.50c.
Copper, electrolytic	11.50c. to 12.50c.
Copper, castings	10.75c. to 11.75c.
*Copper sheets, hot-rolled	17.75c.
*High brass sheets	15.87½c.
*Seamless brass tubes	18.12½c.
*Seamless copper tubes	18.25c.
*Brass rods	13.87½c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	5.75c. to 6.75c.
Lead, bar	6.75c. to 7.75c.
Lead, sheets, cut	8.75c.
Antimony, Asiatic	13.00c. to 14.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.50c. to 20.00c.
Solder, ½ and ½	31.00c. to 32.00c.
Babbitt metal, commercial grades	25.00c. to 65.00c.

* These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33⅓ per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	54.50c.
Tin, bar	56.50c.
Copper, Lake	11.50c. to 11.75c.
Copper, electrolytic	11.50c. to 11.75c.
Copper, castings	11.25c. to 11.50c.
Zinc, slabs	6.50c. to 6.75c.
Lead, American pig	6.10c. to 6.30c.
Lead, bar	8.50c.
Antimony, Asiatic	15.50c.
Babbitt metal, medium grade	20.50c.
Babbitt metal, high grade	61.00c.
Solder, ½ and ½	32.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.12½c.	8.87½c.
Copper, hvy. and wire	8.00c.	8.50c.
Copper, light and bottoms	7.25c.	7.75c.
Brass, heavy	4.87½c.	5.50c.
Brass, light	4.00c.	4.75c.
Hvy. machine composition	7.00c.	7.50c.
No. 1 yel. brass turnings	6.00c.	6.50c.
No. 1 red brass or compos. turnings	6.75c.	7.25c.
Lead, heavy	4.25c.	4.62½c.
Sheet aluminum	13.25c.	14.75c.
Zinc	2.50c.	2.87½c.
Cast aluminum	12.12½c.	13.25c.

IRON AND STEEL SCRAP

. . . Composite up $1.16 to $17.33; highest since Jan. 29, 1929.

o o o

. . . Heavy sales at Pittsburgh and Youngstown; stronger sentiment elsewhere.

LED off by an advance of $1.25 on heavy melting steel at Pittsburgh, all principal markets are up from 25c. to 75c. a ton, with some other grades up $1 to $2 a ton at Chicago. These changes have forced the composite figure $1.16 higher to $17.33 a gross ton, the highest level established since Jan. 29, 1929, when it was $17.58. The buying reappearing at Pittsburgh and Youngstown is considered by many merely a prelude to an even stronger consumer demand that will continue for some time to come. In anticipation of this demand, brokers and dealers are holding accumulations for the higher prices they expect to be established or are selling ahead only in small lots so that there will be ample opportunity to cover their commitments.

Pittsburgh

Sale by a local mill of a substantial tonnage of No. 1 into consumption at a delivered price of $19.25 has caused an advance of $1.25 a ton over last week's quotations. The market is exceptionally strong, and, in view of the high operating rate in this district, it is expected the situation will show little change in the near future and will probable exhibit further strength. Some brokers have been offering to sell consumers at $19 while others are holding off, expecting a higher market. In addition to the high operating rate, part of the strength can be attributed to the coming of colder weather. The tight situation with regard to pig iron resulting from coke shortages is exerting its influence. Specialties have shown further strength and are in demand.

Chicago

Price changes are coming fast and advances of $1 to $2 a ton take place within a week's time. Brokers are bidding close to $18 delivered, for railroad steel and nominal quotations to mills are at $17.50, which is the figure at which brokers are trading in that grade. The market is without doubt the strongest since 1923 and price levels are already at the 1929 average. Few of those who have scrap are convinced that the top has been reached and therefore transactions are in small lots.

Cleveland

Steel-making scrap has advanced 75c. a ton in the Youngstown district, where one consumer purchased 15,000 to 20,000 tons late in the week, paying $18.25 for No. 1, $17.50 for No. 2, $16.75 for No. 2 bundles and $17.75 for No. 1 busheling. Brokers are reported to be paying as high as $18 for No. 1 steel and $17.50 for No. 1 busheling for shipment against these new orders. Higher Youngstown prices are reflected in a 25c. advance on steel-making grades in Cleveland, although there have been no recent sales to test local prices. The New York Central Railroad has sold cast iron car wheels at $17.50, an advance of $2 a ton, but rejected bids for most of the scrap in its December list because it considered that bids were too low. The Nickel Plate Railroad will receive bids Dec. 26 for 4600 gross tons of relaying rails, 500,000 second-hand tie plates, 9000 pair second-hand rail joints and 34,800 second-hand rail anchors.

Philadelphia

Steadily strengthening consumer price sentiment and brokers' buying prices for material to cover old orders are reflected in advances for No. 1 and No. 2 steel, which are now quoted from $15.50 to $16 and $14 to $14.50, respectively. Upward changes also were made in cast grades, specialties and other items, on the basis of mill sales made within the past week. A sale of No. 1 steel is looked for shortly, but few brokers will sell as shipments on old orders are requiring practically all of that grade they can currently secure. Mills, however, are now evincing more interest than has been the case for the past several weeks. Typical of dealers' buying prices reported is $15.75 for No. 1 at Claymont, while American Bridge at Pencoyd is said to have offered $14 for No. 2.

Buffalo

Sales of cupola cast scrap at $15 and short rails at $18 to $18.50 are noted, with cast scrap particularly in demand in a market which continues strong. One of the local mills is reported to have made several purchases outside of No. 1 heavy melting steel on a basis of $17. On this basis, the mill paid $15.50 for its No. 2 steel. Dealers who recently sold No. 2 at $15 are having some difficulty in filling orders. Dealers have paid as high as $10.50 for borings and turnings.

Boston

Prices and business have improved. Dealers are actively bidding $11.90 a ton f.o.b. for No. 1 steel, up 25c. for the week, and intimate that for large tonnage they will pay 25c. more. Steel turning, bundled skeleton and blast furnace material values are up 50c. a ton, and shafting 25c. to 50c. In the export market prices are also firmer.

New York

Increased demand for scrap has caused a further stiffening in prices, and principal grades are up 50c. a ton. Practically all Eastern mills are in the market. New York dealers are now offering $11.50 to $12.50 for No. 1 steel, and have raised their quotation on No. 2 to $10 to $11.50. A number of cast items have also advanced. Supplies are not coming out very freely, partly as a consequence of recent rains which interfered with the collection of material. The export situation is a strengthening factor, as it appears that both Japan and Italy overstayed the market and are now actively attempting to contract for supplies. England, too, is inquiring. Brokers have raised export buying prices 50c. a ton.

St. Louis

Dealers have increased their prices 75c. a ton on No. 2 steel, 50c. on No. 1 steel and iron car axles and 25c. on selected heavy steel, in an effort to bring out scrap with which to fill orders already booked. No new sales were recorded during the week, and none is expected until after Jan. 15.

Detroit

Largely in sympathy with out-of-town markets, Detroit scrap prices have moved up 50c. a ton on many of the principal grades. A large local consumer has taken no scrap in last three weeks, but must enter the market shortly. Whereas little scrap has moved out of town, some of it is bound to do so if Youngstown and Pittsburgh prices continue upward, even considering the addition of freight rates to those points. Aside from out-of-town bidding, other factors tending to restrict supply and advance prices are the slowing up of yard operations owing to cold weather and curtailment of supply as a result of labor difficulties in some plants. Incidentally several sit-down strikes have occurred in scrap yards within the last fortnight, the object being to raise wages.

Cincinnati

Several scrap sales the past week, each of which amounted to several thousand tons, stimulated dealer reports that long expected mill buying had commenced. As a result, bids increased, as dealers competed strenuously to improve their positions.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$18.75 to $19.25
No. 2 hvy. mltng. steel.	17.00 to 17.50
No. 2 RR. wrought....	18.75 to 19.25
Scrap rails	19.00 to 19.50
Rails, 3 ft. and under..	21.50 to 22.00
Comp. sheet steel ...	18.75 to 19.25
Hand. bundled sheets.	17.50 to 18.00
Hvy. steel axle turn...	17.00 to 17.50
Machine shop turn.....	12.50 to 13.00
Short shov. turn.	13.00 to 13.50
Mixed bor. & turn.....	12.00 to 12.50
Cast iron borings	13.00 to 13.50
Cast iron carwheels...	17.50 to 18.00
Hvy. breakable cast...	14.50 to 15.00
No. 1 cast	16.50 to 17.00
RR. knuckles & cplrs..	22.00 to 22.50
Rail coil & leaf springs	22.00 to 22.50
Rolled steel wheels....	22.00 to 22.50
Low phos. billet crops.	22.50 to 23.00
Low phos. sh. bar....	22.00 to 22.50
Low phos. punchings..	21.50 to 22.00
Low phos. plate scrap.	21.50 to 22.00
Steel car axles	21.50 to 22.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.75 to $16.25
No. 2 hvy. mltng. steel.	14.75 to 15.25
Comp. sheet steel	15.25 to 15.75
Light bund. stampings	11.75 to 12.25
Drop forge flashings..	14.75 to 15.25
Machine shop turn.....	11.50 to 12.00
Short shov. turn.	11.25 to 12.00
No. 1 busheling	14.75 to 15.25
Steel axle turnings....	12.25 to 12.75
Low phos. billet crops	19.00 to 19.50
Cast iron borings	11.75 to 12.25
Mixed bor. & turn....	11.75 to 12.25
No. 2 busheling	11.75 to 12.25
No. 1 cast	18.00 to 18.50
Railroad grate bars...	9.00 to 9.50
Stove plate	9.00 to 9.50
Rails under 3 ft.	19.00 to 19.50
Rails for rolling	16.50 to 17.00
Railroad malleable	17.75 to 18.00
Cast iron carwheels....	.... 17.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.50 to $16.00
No. 2 hvy. mltng. steel.	14.00 to 14.50
Hydraulic bund., new.	15.50 to 16.00
Hydraulic bund., old.	13.00 to 13.50
Steel rails for rolling..	17.00 to 17.50
Cast iron carwheels..	17.00 to 17.50
Hvy. breakable cast...	16.00 to 16.50
No. 1 cast	17.00 to 17.50
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable ...	16.50 to 17.00
Machine shop turn....	.... 10.00
No. 1 blast furnace....	8.50 to 9.00
Cast borings	8.50 to 9.00
Heavy axle turnings..	.... 14.00
No. 1 low phos. hvy....	20.00 to 20.50
Couplers & knuckles ..	20.50 to 21.00
Rolled steel wheels ...	20.50 to 21.00
Steel axles	20.50 to 21.00
Shafting	21.00 to 21.50
No. 1 RR. wrought....	16.00 to 16.50
Spec. iron & Steel pipe	14.50 to 15.00
Bundled sheets	14.00 to 14.50
No. 1 forge fire.....	14.50 to 15.00
Cast borings (chem.).	10.50 to 13.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel.....	$17.00 to $17.50
Auto. hvy. mltng. steel.	14.75 to 15.25
Alloy free	15.75 to 16.25
Shoveling steel	17.00 to 17.50
Hydraul. comp. sheets.	16.25 to 16.75
Drop forge flashings..	14.50 to 15.00
No. 1 busheling	15.00 to 15.50
Rolled carwheels	19.00 to 19.50
Railroad tires, cut	19.00 to 19.50
Railroad leaf springs..	19.00 to 19.50
Axle turnings	16.00 to 16.50
Steel coup. & knuckles	19.00 to 19.50
Coil springs	22.00 to 22.50
Axle turn. (elec.)	16.50 to 17.00
Low phos. punchings..	21.00 to 21.50
Low phos. plates, 12 in. and under	21.00 to 21.50
Cast iron borings	9.50 to 10.00
Short shov. turnings..	11.00 to 11.50
Machine shop turn....	8.50 to 9.00
Rerolling rails	17.50 to 18.00
Steel rails under 3 ft...	18.50 to 19.00
Steel rails under 2 ft...	20.50 to 21.00
Angle bars, steel	19.25 to 19.75
Cast iron carwheels ..	18.00 to 18.50
Railroad malleable	19.50 to 20.00
Agric. malleable	15.50 to 16.00
	Per Net Ton
Iron car axles	20.50 to 21.00
Steel car axles	$19.50 to $20.00
No. 1 RR. wrought....	15.00 to 15.50
No. 2 RR. wrought....	15.25 to 15.75
No. 2 busheling, old..	6.75 to 7.25
Locomotive tires	14.00 to 14.50
Pipes and flues	11.00 to 11.50
No. 1 machinery cast..	15.00 to 15.50
Clean auto. cast	14.00 to 14.50
No. 1 railroad cast ..	14.00 to 14.50
No. 1 agric. cast	11.50 to 12.00
Stove plate	8.75 to 9.25
Grate bars	11.50 to 12.00
Brake shoes	11.50 to 12.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel.	$16.00 to $16.50
No. 2 hvy. mltng. steel.	14.50 to 15.00
Scrap rails	16.00 to 16.50
New hy. b'ndled sheets	14.50 to 15.00
Old hydraul. bundles ..	13.00 to 13.50
Drop forge flashings ...	14.50 to 15.00
No. 1 busheling	14.25 to 15.00
Hvy. axle turnings....	10.50 to 11.00
Machine shop turn....	9.50 to 10.00
Knuckles & couplers..	19.50 to 20.00
Coil & leaf springs....	19.50 to 20.00
Rolled steel wheels....	19.50 to 20.00
Low phos. billet crops.	19.50 to 20.00
Short shov. turnings..	10.50 to 11.00
Mixed bor. & turn.....	10.50 to 11.00
Cast iron borings	10.50 to 11.00
No. 2 busheling	11.00 to 11.50
Steel car axles	17.00 to 17.50
Iron axles	12.00 to 12.50
No. 1 machinery cast..	15.50 to 16.00
No. 1 cupola cast	15.00 to 15.50
Stove plate	13.00 to 13.50
Steel rails under 3 ft..	17.50 to 18.00
Cast iron carwheels...	15.50 to 16.00
Railroad malleable	17.00 to 18.00
Chemical borings	10.50 to 11.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel.....	$12.50 to $13.00
Scrap steel rails	12.50 to 13.00
Short shov. turnings..	.... 8.00
Stove plate	.... 8.50
Steel axles	.... 15.00
Iron axles	.... 15.00
No. 1 RR. wrought....	.... 10.00
Rails for rolling	.... 14.00
No. 1 cast	.... 13.50
Tramcar wheels	.... 13.00

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:

Selected hvy. steel....	$15.50 to $16.00
No. 1 hvy. melting....	15.00 to 15.50
No. 2 hvy. melting....	14.25 to 14.75
No. 1 locomotive tires..	13.50 to 14.00
Misc. stand.-sec. rails.	15.75 to 16.25
Railroad springs	17.25 to 17.75
Bundled sheets	9.50 to 10.00
No. 2 RR. wrought ...	15.25 to 15.75
No. 1 busheling	8.50 to 9.00
Cast bor. & turn.....	5.50 to 6.00
Rails for rolling	16.75 to 17.25
Machine shop turn....	4.00 to 4.50
Heavy turnings	10.50 to 11.00
Steel car axles	18.50 to 19.00
Iron car axles	19.50 to 20.00
No. 1 RR. wrought....	12.50 to 13.00
Steel rails under 3 ft..	13.00 to 13.50
Steel angle bars.....	15.50 to 16.00
Cast iron carwheels...	14.00 to 14.50
No. 1 machinery cast.	12.50 to 13.00
Railroad malleable	15.50 to 16.00
No. 1 railroad cast....	12.50 to 13.00
Stove plate	7.50 to 8.00
Agricul. malleable	12.50 to 13.00
Grate bars	9.00 to 9.50
Brake shoes	11.25 to 11.75

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$14.75 to $15.25
No. 2 hvy. mltng. steel.	12.25 to 12.75
Scrap rails for mltng..	14.75 to 15.25
Loose sheet clippings..	9.25 to 9.75
Bundled sheets	11.25 to 11.75
Cast iron borings	7.25 to 7.75
Machine shop turns....	8.25 to 8.75
No. 1 busheling	11.75 to 12.25
No. 2 busheling	7.25 to 7.75
Rails for rolling	15.75 to 16.25
No. 1 locomotive tires.	13.25 to 13.75
Short rails	18.25 to 18.75
Cast iron carwheels ..	14.25 to 14.75
No. 1 machinery cast..	15.25 to 15.75
No. 1 railroad cast	14.25 to 14.75
Burnt cast	10.25 to 10.75
Stove plate	10.25 to 10.75
Agricult. malleable ...	14.25 to 14.75
Railroad malleable	15.75 to 16.25

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$13.00 to $13.50
No. 2 hvy. mltng. steel.	12.25 to 12.75
Borings and turnings..	8.75 to 9.25
Long turnings	8.50 to 9.00
Short shov. turnings..	9.50 to 10.00
No. 1 machinery cast..	14.50 to 15.00
Automotive cast	14.50 to 15.00
Hydraul. comp. sheets.	13.50 to 14.00
Stove plate	8.50 to 9.00
New factory bushel...	12.50 to 13.00
Old No. 2 busheling ..	8.25 to 8.75
Sheet clippings	10.25 to 10.75
Flashings	12.50 to 13.00
Low phos. plate scrap.	14.00 to 14.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$10.75	$10.50
No. 2 hvy. mltng. steel.	9.75	9.25
Mixed dealers steel	7.75	7.75
Scrap pipe	6.75	6.50
Steel turnings	4.25	4.25
Cast iron turnings	4.75	4.50
Machinery cast	11.75	11.00
Dealers cast	10.75	10.00
Stove plate	7.25	6.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$17.50 to $18.00
Hydraulic bundles	16.75 to 17.25
Machine shop turn.....	12.00 to 12.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$11.50 to $12.50
No. 2 hvy. mltng. steel.	10.00 to 11.50
Hvy. breakable cast...	11.50 to 12.00
No. 1 machinery cast.	12.00 to 12.50
No. 2 cast	11.00 to 11.50
Stove plate	9.50 to 9.75
Steel car axles	17.00 to 18.00
Shafting	16.00 to 17.00
No. 1 RR. wrought ...	12.00 to 12.50
No. 1 wrought long....	11.00 to 11.50
Spec. iron & steel pipe	10.50 to 11.00
Forge fire	9.50 to 10.00
Rails for rolling	13.50 to 14.00
Short shov. turnings..	6.00 to 6.50
Machine shop turn....	6.00 to 6.50
Cast borings	6.00 to 6.50
No. 1 blast furnace	6.00 to 6.50
Cast borings (chem.)..	10.00 to 11.00
Unprepar. yard scrap.	6.00 to 6.50

Per gross ton, delivered local foundries:

No. 1 machn. cast.....	$14.00 to $14.50
No. 1 hvy. cast cupola.	11.50 to 12.00
No. 2 cast	10.50 to 11.00

Add 25c. to 50c. to above quotations to secure North Jersey prices.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	.... $11.90
Scrap rails	.... 11.90
No. 2 steel	$9.90 to 10.15
Breakable cast	10.25 to 10.50
Machine shop turn....	.... 6.40
Unmixed bor. & turn..	.... 5.90
Bund. skeleton long...	10.25 to 10.30
Shafting	16.25 to 16.50
Cast bor. chemical.....	6.00 to 7.00

Per gross ton delivered consumers' yards:

Textile cast	$13.00 to $13.50
No. 1 machine cast ..	13.00 to 13.50
Stove plate.....	9.50 to 10.00

EXPORT

Dealers' buying prices per gross ton:

New York, delivered alongside barges

No. 1 hvy. mltng. steel.	.... $11.50
No. 2 hvy. mltng. steel.	.... 10.50
No. 2 cast	.... 10.50
Stove plate	.... 9.50
Rails (scrap)	$10.25 to 11.50

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	$12.25 to $12.50
No. 2 hvy. mltng. steel.	11.25 to 11.50
Rails (scrap)	12.50
Stove plate	7.75 to 8.00
Machine shop turn....	.... 6.25

New Orleans, on cars at Stuyvesant Dock

No. 1 hvy. mltng. steel.	$12.60 to $12.75
No. 2 hvy. mltng. steel.	11.60 to 11.75

Los Angeles, on cars or trucks at local piers

No. 1 hvy. mltng. steel.	$10.50 to $11.00
Compressed bundles ..	8.50 to 9.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$32.00 to $34.00
Forging quality	39.00 to 40.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$32.00 to $34.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.80c. to 1.90c.

Wire Rods

(No. 5 to 15/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$43.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	44.00
F.o.b. Worcester, Mass.	45.00
F.o.b. Birmingham	46.00
F.o.b. San Francisco	52.00
F.o.b. Galveston	49.00

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.05c. to 2.20c.
F.o.b. Chicago or Gary	2.10c. to 2.25c.
F.o.b. Duluth	2.20c. to 2.35c.
Del'd Detroit	2.20c. to 2.35c.
F.o.b. Cleveland	2.10c. to 2.25c.
F.o.b. Buffalo	2.15c. to 2.30c.
Del'd Philadelphia	2.36c. to 2.51c.
Del'd New York	2.40c. to 2.55c.
F.o.b. Birmingham	2.20c. to 2.35c.
F.o.b. cars dock Gulf ports	2.45c. to 2.60c.
F.o.b. cars Pacific ports	2.60c. to 2.75c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.90c. to 2.05c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	1.95c. to 2.10c.
F.o.b. Buffalo	2.00c. to 2.15c.
F.o.b. Birmingham	2.05c. to 2.20c.
F.o.b. cars dock Gulf ports	2.30c. to 2.45c.
F.o.b. cars dock Pacific ports	2.45c. to 2.60c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.05c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.10c.
Del'd Detroit	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	1.90c.
F.o.b. Buffalo, Cleveland Youngstown, Chicago, Gary or Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Pittsburgh (refined)	2.10c.
Delivered New York	2.05c.
Delivered Philadelphia	2.10c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.35c. to 2.55c.
F.o.b. Cleveland, Chicago and Gary	2.40c. to 2.60c.
F.o.b. Buffalo	2.45c. to 2.65c.
Del'd Detroit	2.50c. to 2.70c.
Del'd eastern Michigan	2.55c. to 2.75c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.90c. to 2.05c.
F.o.b Chicago or Gary	1.95c. to 2.10c.
Del'd Cleveland	2.095c. to 2.245c.
F.o.b. Coatesville or Spar. Pt.	2.00c. to 2.15c.
Del'd Philadelphia	2.09c. to 2.24c.
Del'd New York	2.19c. to 2.34c.
F.o.b. Birmingham	2.05c. to 2.20c.
F.o.b. cars dock Gulf ports	2.30c. to 2.45c.
F.o.b. cars dock Pacific ports	2.45c. to 2.60c.
Wrought iron plates, f.o.b. Pittsburgh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.45c.
F.o.b. Chicago	3.50c.
F.o.b. Coatesville	3.55c.
F.o.b. cars dock Gulf ports	3.85c.
F.o.b. cars dock Pacific ports	4.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.90c. to 2.05c.
F.o.b. Chicago	1.95c. to 2.10c.
Del'd Cleveland	2.095c. to 2.245c.
F.o.b. Buffalo or Bethlehem	2.00c. to 2.15c.
Del'd Philadelphia	2.115c. to 2.265c.
Del'd New York	2.1625c. to 2.3125c.
F.o.b. Birmingham (standard)	2.05c. to 2.20c.
F.o.b. cars dock Gulf ports	2.30c. to 2.45c.
F.o.b. cars dock Pacific ports	2.45c. to 2.60c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.25c. to 2.40c.
F.o.b. Chicago or Buffalo	2.35c. to 2.50c.
F.o.b. cars dock Gulf or Pacific Coast ports	2.70c. to 2.85c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb. per gross ton	$39.00
Angle bars, per 100 lb.	2.55c. to 2.70c.

F.o.b. Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes	2.75c. to 2.90c.
Tie plates, steel	2.00c. to 2.10c.
Tie plates, Pacific Coast ports	2.10c. to 2.20c.
Track bolts, to steam railroads	3.75c. to 4.00c.
Track bolts, to jobbers, all sizes (per 100 counts) 70 per cent off list	

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.15c.
No. 10, f.o.b. Gary	2.25c.
No. 10, del'd Detroit	2.35c.
No. 10, del'd Philadelphia	2.46c.
No. 10, f.o.b. Birmingham	2.30c.
No. 10, f.o.b. cars dock Pacific ports	2.70c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.80c.
No. 24, f.o.b. Gary	2.90c.
No. 24, del'd Detroit	3.00c.
No. 24, del'd Philadelphia	3.11c.
No. 24, f.o.b. Birmingham	2.95c.
No. 24, f.o.b. cars dock Pacific ports	3.45c.
No. 24, wrought iron, Pittsburgh	4.50c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.80c.
No. 10 gage, f.o.b. Gary	2.90c.
No. 10 gage, f.o.b. Detroit	3.00c.
No. 10 gage, del'd Philadelphia	3.11c.
No. 10 gage, f.o.b. Birmingham	2.95c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.40c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.25c.
No. 20 gage, f.o.b. Gary	3.35c.
No. 20 gage, del'd Detroit	3.45c.
No. 20 gage, del'd Philadelphia	3.56c.
No. 20 gage, f.o.b. Birmingham	3.40c.
No. 20 f.o.b. cars dock Pacific ports	3.80c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.40c.
No. 24, f.o.b. Gary	3.50c.
No. 24, del'd Philadelphia	3.71c.
No. 24, f.o.b. Birmingham	3.55c.
No. 24, f.o.b. cars dock Pacific ports	4.00c.
No. 24, wrought iron, Pittsburgh	5.15c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.70c.
F.o.b. Gary	3.80c.
F.o.b. cars dock Pacific ports	4.40c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.20c.
No. 20, f.o.b. Gary	3.30c.
No. 20, f.o.b. Birmingham	3.80c.
No. 20, f.o.b. cars dock Pacific ports	3.80c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.95c.
No. 28, Gary	3.05c.
No. 28, cars dock Pacific ports	3.55c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.15c.
All widths up to 24 in., Chicago	2.25c.
All widths up to 24 in., del'd Detroit	2.35c.
All widths up to 24 in., Birmingham	2.30c.
Cooperage stock, Pittsburgh	2.25c.
Cooperage stock, Chicago	2.35c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	2.85c.
F.o.b. Cleveland	2.85c.
Del'd Chicago	3.145c.
F.o.b. Worcester	3.05c.

* Carbon 0.25 and less.

Cold-Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	2.85c.	3.05c.
Carbon	.51- .75	3.70c.	3.90c.
Carbon	.76-1.00	5.45c.	5.65c.
Carbon	Over 1.00	7.50c.	7.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.10c.
No. 14, Worcester	3.50c.
No. 20, Pittsb'gh or Cleveland	3.50c.
No. 20, Worcester	3.90c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Spring wire	3.20c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.25
Smooth coated nails	2.25

	Base per 100 Lb.
Annealed fence wire	$2.80 to $2.90
Galvanized fence wire	3.15 to 3.30
Polished staples	2.95
Galvanized staples	3.20
Barbed wire, galvanized	2.75
Twisted barbless wire	2.75
Woven wire fence, base column	63.00
Single loop bale ties, base column	55.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	57	37	⅛	+91½	+138
¼ to ⅜	60	44½	¼ & ⅜	+1½	+21½
½	64½	55	½	31½	15
¾	67½	59	¾	36½	20½
1 to 3	69½	61½	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	62	53½	2	37	22½
2½ to 3.65		56½	2½ to 3½	38	25
3½ to 6.67		58½	4 to 8	40	28½
7 & 8.66		56½	9 to 12	38	24½
9 & 10.65		56½			
11 & 12.64		55			

Butt Weld, extra strong, plain ends

⅛	55½	42½	⅛	+13	+45½
¼ to ⅜	57½	46½	¼ & ⅜	+2½	+34½
½	62½	54½	½	32½	17½
¾	66½	58½	¾	37½	22½
1 to 3	68	61	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	60	52½	2	40	26
2½ to 3.64		56½	2½ to 4.45	41½	33
3½ to 6.67		60	4½ to 6.45		33½
7 & 8.	66	57	7 & 8.46		33
9 & 10.	65	56	9 to 12.41	41½	30
11 & 12.	64	55			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$ 7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2¼ in. o.d.	12 B.W.G.	17.61	16.01
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	$21.45	$19.50
4½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. od.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.90

Extra for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago.	$50.40
6-in. and larger, del'd New York	48.00
*6-in. and larger, Birmingham	42.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	50.00
F.o.b. dock, Seattle	42.50
4-in., f.o.b. dock, San Francisco or Los Angeles	53.00
F.o.b. dock, Seattle	53.50

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

* Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $41, Birmingham, and $49.50, delivered Chicago; and 4-in. pipe, $44, Birmingham, and $52.40 a ton, delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. x 6 in. and smaller	70
Larger than ½ in.	65 and 10
Lag bolts	65 and 10
Plow bolts, Nos. 1, 2, 3, and 7 heads	65, 10 and 10
Hot-pressed nuts, blank or tapped, square	65 and 10
Hot-pressed nuts, blank or tapped, hexagon	65 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	65 and 10
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes	60, 20 and 5
Stove bolts in packages, nuts attached	72½
Stove bolts in packages, with nuts separate	72½ and 5
Stove bolts in bulk	81½

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.25
F.o.b. Chicago or Birmingham	3.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm.	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lbs. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $51 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.55c. to 2.75c.
Delivered, Detroit	2.70c. to 2.90c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.25
2100 (2½% Nickel)	0.95
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30) Molybdenum (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.10c.
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.40
Carbon Vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric turned steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.05c. to 3.25c. base per lb. Delivered Detroit, 3.20c. to 3.40c.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	23c.

TOOL STEEL

	Base per Lb.
High speed	57½c.
High carbon chrome	37c.
Oil hardening	21c.
Special	19c.
Extra	15¾c.
Regular	12½c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Based on Exchange rate as of Dec. 9

Ferromanganese, export	$44.10
Billets, open-hearth	28.78 to $31.01
Tin plate, per base box	4.59
Steel bars, open-hearth	38.59
Beams, open-hearth	37.36
Channels, open-hearth	38.59
Angles, open-hearth	37.36
Black sheets, No. 24 gage	53.87
Galvanized sheets, No. 24 gage	64.92

CONTINENTAL

Per Metric Ton, f.o.b. Continental Ports

Based on Exchange rate of Dec. 9

Billets, Thomas	$15.51
Wire rods, No. 5 B.W.G.	25.70
Steel bars, merchant	20.65
Sheet bars	15.79
Plate, ¼ in. and up	30.94
Plate, 3/16 in. and 5 mm.	26.36
Sheets, ⅛ in.	25.67
Beams, Thomas	17.82
Angles (Basic)	17.82
Hoops and strip, base	22.84
Wire, plain, No. 8	30.66
Wire nails	32.83
Wire, barbed, 4 pt. No. 10 B.W.G.	49.97

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH

	Base per Lb.
Plates	3.25c.
Structural shapes	3.25c.
Soft steel bars and small shapes	3.15c.
Reinforcing steel bars	3.15c.
Cold-finished and screw stock:	
Rounds and hexagons	3.60c.
Squares and flats	3.60c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	3.30c.
Hoops	3.80c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.45c.
Galv. sheets (No. 24), 25 or more bundles	4.05c.
Hot-rolled sheets (No. 10)	3.05c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.77
Spikes, large	3.25c.
	Per Cent Off List
Track bolts, all sizes, per 100 count	60
Machine bolts, 100 count	65-5
Carriage bolts, 100 count	65-5
Nuts, all styles, 100 count	65-5
Large rivets, base per 100 lb.	$3.65
Wire, black, soft ann'l'd, base per 100 lb.	3.15c.
Wire, galv. soft, base per 100 lb.	3.55c.
Common wire nails, per keg	2.50c.
Cement coated nails, per keg	2.50c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, rounds	3.20c.
Soft steel bars, squares and hexagons	3.35c.
Cold-fin. steel bars:	
Rounds and hexagons	3.75c.
Flats and squares	3.75c.
Hot-rolled strip	3.40c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.65c.
Spikes (keg lots)	3.85c.
Track bolts (keg lots)	4.85c.
Rivets, structural (keg lots)	3.80c.
Rivets, boiler (keg lots)	3.90c.
	Per Cent Off List
Machine bolts	*65
Carriage bolts	*65
Lag screws	*65
Hot-pressed nuts, sq. tap or blank	*65
Hot-pressed nuts, hex. tap or blank	*65
Hex. head cap screws	60
Cut point set screws	75 and 10
Flat head bright wood screws	62 and 20
Spring cotters	55
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.95
Com. wire nails, 50 kegs or more	2.50c.†
Cement c't'd nails, 50 kegs or more	2.50c.†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants wihtin the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.50c.
Structural shapes	3.47c.
Soft steel bars, rounds	3.51c.
Iron bars, Swed. charcoal	6.75c. to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.06c.
Flats and squares	4.06c.
Cold-rolled: strip, soft and quarter hard	3.36c.
Hoops	3.66c.
Bands	3.66c.
Hot-rolled sheets (No. 10)	3.15c. to 3.41c.
Hot-rolled ann'l'd sheets (No. 24*)	3.75c. to 4.10c.
Galvanized sheets (No. 24*)	4.10c. to 4.50c.
Long terne sheets (No. 24)	5.25c. to 5.35c.
Armco iron, galv. (No. 24†)	5.65c.
Toncan iron, galv. (No. 24†)	5.65c.
Galvannealed (No. 24†)	5.75c.
Armco iron, hot-rolled annealed (No. 24†)	5.10c.
Toncan iron, hot-rolled annealed (No. 24†)	5.10c.
Armco iron hot-rolled (No. 10†)	4.15c.
Toncan iron, hot-rolled (No. 10†)	4.15c.
Cold-rolled sheets (No. 20) less than 1000 lbs.	
Standard quality	4.65c.
Deep drawing	5.40c.
Stretcher leveled	5.40c.
SAE, 2300, hot-rolled	6.97c.
SAE, 3100, hot-rolled	5.37c.
SAE, 6100, hot-rolled, annealed	9.57c.
SAE, 2300, cold-rolled	8.03c.
SAE, 3100, cold-rolled, annealed	7.43c.
Floor plate ⅛ in. and heavier	5.30c.
Standard tool steel	11.25c.
Wire, black annealed (No. 9)	3.50c.
Wire, galv. (No. 9)	3.85c.
Tire steel, 1 x ½ in. and larger	3.85c.
Open-hearth spring steel	4.00c. to 10.00c.
Common wire nails, base per keg	$3.21
	Per Cent Off List
Machine bolts, square head and nut:	
All diameters	65 and 10
Carriage bolts, cut thread:	
All diameters	65 and 10

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.55c.
Bars, soft steel (rounds and flats)	3.45c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.60c.
Cold-fin. rounds, shafting, screw stock	4.00c.
Hot-rolled annealed sheets (No. 24)	4.30c.
Galv. sheets (No. 24)	4.90c.
Hot-rolled sheets (No. 10)	3.40c.
Black corrug. sheets (No. 24)	4.30c.
*Galv. corrug. sheets	4.90c.
Structural rivets	4.15c.
Boiler rivets	4.25c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	65

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.10c.
*Structural shapes	3.10c.
*Soft steel bars, small shapes, iron bars (except bands)	3.25c.
‡Reinforc. steel bars, sq. twisted and deformed	3.01c.
Cold-finished steel bars	4.01c.
*Steel hoops	3.55c.
*Steel bands, No. 12 and 3/16 in. incl.	3.30c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	4.15c.
†Galvanized sheets (No. 24)	4.80c.
*Hot-rolled annealed sheets (No. 10)	3.20c.
Diam. pat. floor plates, ¼ in.	5.05c.
Swedish iron bars	6.25c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.41c.
Soft steel bars	3.10c.
‡Reinforc. steel bars	2.10c.
†Cold-finished steel bars	3.75c.
Flat-rolled steel under ¼ in.	3.46c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.91c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.21c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.46c.
*Black ann'l'd wire, per 100 lb.	$2.80
*No. 9 galv. wire, per 100 lb.	3.15
*Com. wire nails, base per keg	2.25

†Outside delivery 10c. less.

*For 5000 lb. or less.

‡Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.52c.
Floor plates	5.27c.
Bars, rounds, flats and angles	3.42c.
Other shapes	3.57c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.57c.
Cold-finished bars	3.97c.
Hot-rolled annealed sheets (No. 24) 25 bundles or more	3.72c.
Galv. sheets (No. 24) 3750 lb. or more	4.07c.
Galvanized sheets (No. 24) over 3500 lb.	4.07c.
Hot-rolled sheets (No. 10)	3.32c.
Structural rivets	4.50c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload.	3.04
Cement c't'd nails, base 100-lb keg	3.50
Chain, lin. per 100 lb	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$20.37
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

	Base per Lb.
Plates	3.48c.
Struc. shapes	3.35c.
Soft steel bars	3.25c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.80c.
Rounds and hex.	3.80c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.26c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.53c.
Galv. sheet (No. 24)	4.80c.
Bands	3.53c.
Hoops	3.53c.
Heavy top-rolled sheets	3.28c.
Com. wire nails, base per keg	$2.85
Black wire, base per 100 lb. (2500-lb. lots or under)	4.00
(Over 2500 lb.)	3.90

BOSTON

	Base per Lb.
Channels, angles	3.65c.
Tees and zees, under 3"	3.90c.
H beams and shapes	3.64c.
Plates — Sheared, tank, and univ. mill, ¼ in. thick and heavier	3.66c.
Floor plates, diamond pattern	5.46c.
Bar and bar shapes (mild steel)	3.65c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.75c. to 4.75c.
Half rounds, half ovals, ovals and bevels	4.90c.
Tire steel	4.90c.
Cold-rolled strip steel	2.45c.
Cold-finished rounds, squares and hexagons	4.15c.
Cold-finished flats	4.10c.
Blue annealed sheets, No. 10 ga.	3.75c.
One pass cold-rolled sheets No. 24 ga.	4.30c.
Galvanized steel sheets, No. 24 ga.	4.30c.
Lead coated sheets, No. 24 ga.	5.95c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.29c.
Structural shapes	3.52c.
Plates	3.52c.
Floor plates	5.27c.
Hot-rolled annealed sheets (No. 24)*	4.14c.
Hot-rolled sheets (No. 10)**	3.24c.
Galvanized sheets (No. 24)	4.82c.
Bands	3.49c.
Hoops	3.49c.
†Cold-finished bars	3.84c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.44c.
Bolts and nuts, in cases, 70 and 10 per cent off list	
Broken cases..65 and 10 per cent off	

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

* Base less 0.25c., 3500 lb. and over. Add 0.50c. per hundred lb. for broken bundles.

** Base less 0.25c., 1500 to 3749 lbs.; less 0.50c., 3750 to 7499 lb.; less 0.75c., 7500 lb. and over.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

Country territory to be equalized on the Chicago plan.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.41c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.31c.
Soft steel bars, squares and hexagons	3.46c.
Hot-rolled strip	3.51c.
Hot-rolled sheets (No. 10)	3.26c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 20)	4.76c.
Cold-finished steel bars	3.76c.
Cold-rolled strip	3.33c.
Structural rivets (keg lots)	4.01c.
Boiler rivets, cone head (keg lots)	4.11c.
Track spikes (keg lots)	4.06c.
Track bolts (keg lots)	5.06c.
Black annealed wire	3.40c.
Com. wire nails	2.60c.
Cement coated nails	2.60c.

	Per Cent Off List
Machine bolts carriage bolts and lag screws	70 to 75
Hot-pressed nuts, sq. and hex. tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	3.45c.
Structural shapes	3.55c.
Plates	3.55c.
Cold-finished bars	4.00c.
Bands and hoops	3.65c.
Hot-rolled annealed sheets, No. 24	4.30c.
Galvanized sheets, No. 24	4.90c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	3.20c.
Structural shapes	3.10c.
Reinforcing bars	....prices on application
Plates	3.10c.
Hot-rolled sheets, No. 10	3.20c.
Bands	3.30c.
Hoops	3.55c.
Special threading steel	3.20c.
Diamond pattern floor plates ¼ in. and heavier	5.10c.
Galvanized bars and small shapes	5.70c.
Galvanized bands	5.80c.
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	3.88c.

All prices are for 2000 lb. and more.

For second zone add 10c. per 100 lb. for trucking.

List size extras of Aug. 15, 1935, and cutting extras to be added.

For cold-rolled products, list size extras from Jan. 1, 1936, and cutting extras to be added.

CHATTANOOGA

	Base per Lb.
Mild steel bars	3.46c.
Iron bars	3.46c.
Reinforcing bars	3.46c.
Structural shapes	3.66c.
Plates	3.66c.
Hot-rolled sheets No. 10	3.46c.
Hot-rolled annealed sheets, No. 24*	3.41c.
Galvanized sheets No. 24*	3.96c.
Steel bands	3.71c.
Cold-finished bars	4.281c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	3.57c.
Shapes, bar size	3.57c.
Iron bars	3.57c.
Structural shapes	3.77c.
Plates	3.77c.
Hot-rolled sheets, No. 10	3.57c.
Hot-rolled annealed sheets, No. 24	4.37c.
Galvanized sheets, No. 24	5.07c.
Steel bands	3.82c.
Cold-drawn rounds	4.04c.
Cold-drawn flats, squares, hexagons	6.04c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list	50

NEW ORLEANS

	Base per Lb.
Mild steel bars	3.45c.
Reinforcing bars	3.50c.
Structural shapes	3.65c.
Plates	3.65c.
Hot-rolled sheets, No. 10	3.65c.
Hot-rolled annealed sheets, No. 24	4.35c.
Galvanized sheets, No. 24	4.95c.
Steel bands	4.05c.
Cold-finished steel bars	4.55c.
Structural rivets	4.25c.
Boiler rivets	4.25c.
Common wire nails, base per keg	$2.45
Bolts and nuts, per cent off list	70

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.60c.	3.80c.	3.65c.
Shapes, standard	3.60c.	3.80c.	3.65c.
Soft steel bars	3.60c.	3.80c.	3.90c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.30c.	4.35c.	4.60c.
Hot-rolled sheets (No. 10)	3.70c.	3.90c.	3.85c.
Galv. sheets (No. 24 and lighter)	5.00c.	4.60c.	5.00c.
Galv. sheets (No. 22 and heavier)	5.00c.	4.80c.	5.00c.
Cold finished steel			
Rounds	6.05c.	6.10c.	6.00c.
Squares and hexagons	7.30c.	7.35c.	6.35c.
Flats	7.80c.	7.85c.	7.35c.
Common wire nails—base per keg less carload	$2.90	$2.90	$2.90

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
High-heat duty, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$45.00
High-heat duty, New Jersey	50.00
High-heat duty, Ohio	40.00
Intermediate, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	40.00
Intermediate, New Jersey	43.00
Intermediate, Ohio	35.00
Ground fire clay, per ton	7.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	54.00
Birmingham	$48 to 50.00
Silica cement per net ton	8.00

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$45.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	45.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester, Pa.	$65.00
Chemically bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.75
F.o.b. Bethlehem, Birdsboro, and Swedeland, Pa., and Sparrows Point, Md.	21.50
Delivered Brooklyn	23.9289
Delivered Newark or Jersey City	22.9873
Delivered Philadelphia	22.3132
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	20.50
F.o.b. Jackson, Ohio	22.25
Delivered Cincinnati	20.82
F.o.b. Duluth	21.00
F.o.b. Provo, Utah	18.50
Delivered San Francisco, Los Angeles or Seattle	23.315
F.o.b. Birmingham*	16.88

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of .70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass.	$22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.00
F.o.b. Buffalo	19.50
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	20.00
Delivered Cincinnati	19.82
Delivered Canton, Ohio	21.3482
Delivered Mansfield, Ohio	21.8832
F.o.b. Jackson, Ohio	21.75
F.o.b. Provo, Utah	18.00
F.o.b. Birmingham	15.50

Bessemer

F.o.b. Everett, Mass.	$23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	22.50
Delivered Boston Switching District	24.00
Delivered Newark or Jersey City	23.9873
Delivered Philadelphia	23.3132
F.o.b. Buffalo and Erie, Pa., and Duluth	21.50
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	21.00
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.0807
Delivered Canton, Ohio	22.3482
Delivered Mansfield, Ohio	22.8832

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$25.00

Gray Forge

Valley or Pittsburgh furnace	$20.00

Charcoal

Lake Superior furnace	$23.00
Delivered Chicago	26.2528

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	22.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00
F.o.b. New Orleans	26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 6.00 to 6.50%	$24.00

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$29.00
10.51 to 11.00%	29.50
11.00 to 11.50%	30.00
11.51 to 12.00%	30.50
12.01 to 12.50%	31.00
12.51 to 13.00%	31.50
13.01 to 13.50%	32.00
13.51 to 14.00%	32.50
14.01 to 14.50%	33.00
14.51 to 15.00%	33.50
15.01 to 15.50%	34.00
15.51 to 16.00%	34.50
16.01 to 16.50%	35.00
16.51 to 17.00%	35.50

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$1.30
Ferrotungsten, lots of 5000 lb.	1.35
Ferrotungsten, smaller lots	1.40
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	142.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	58.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	75.00
Ferromolybdenum, per lb. Mo del.	95c.
Calcium molybdate, per lb. Mo del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$38.00
Ton lots or less, per ton	43.00
Silico-manganese, gross ton, delivered.	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00

Note: Spot prices are $5 a ton higher except on 75 per cent ferrosilicon on which premium is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%...	$4.80
Old range, non-Bessemer, 51.50%	4.65
Mesabi, Bessemer, 51.50%	4.65
Mesabi, non-Bessemer, 51.50%	4.50
High phosphorus, 51.50%	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	13.00c. to 13.50c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	10.00c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	27c. to 30c.
Man., African, Indian, 44-48%	25c to 30c.
Man., African, Indian, 49-51%	27c. to 30c.
Man., Brazilian, 46 to 48½%	Nominal..25c. to 30c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid delivered nominal	$15.25 to $15.50
Tungsten, domestic, scheelite delivered, nominal	15.00

Per Gross Ton

Chrome, 45% Cr_2O_3, lamp, c.i.f. Atlantic Seaboard (African)	$17.50
45 to 46% Cr_2O_3 (Turkish)	$16.50 to 17.00
48% Cr_2O_3 (African)	20.50
48% min. Cr_2O_3 (Turkish)	19.25
Chrome concentrate, 50% and over Cr_2O_3, c.i.f. Atlantic ports	22.00
52% Cr_2O_3 (Turkish)	21.75
48 to 49% Cr_2O_3 (Turkish)	19.25

FLUORSPAR *Per Net Ton*

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$18.00 to $19.00
Domestic, barge and rail	18.50 to 19.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	23.00
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	35.00

FUEL OIL *Per Gal.*

F.o.b. Bayonne or Baltimore No. 3 distillate	4.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	3.75c.
Del'd Ch'go, No. 3 industrial	5.00c.
Del'd Ch'go, No. 5 industrial	3.77c.
Del'd Cleve'd, No. 3 distillate	6.00c.
Del'd Cleve'd No. 4 industrial	5.75c.
Del'd Cleve'd No. 5 industrial	5.00c.

COKE AND COAL

Coke *Per Net Ton*

Furnace, f.o.b. Connellsville, Prompt	$4.00 to $4.25
Foundry, f.o.b. Connellsville, Prompt	4.50 to 5.75
Foundry, by-product, Chicago ovens	9.00
Foundry, by-product, del'd New England	12.00
Foundry, by-product, del'd Newark or Jersey City	9.60 to 10.05
Foundry, by-product, Philadelphia	9.85
Foundry, by-product, delivered Cleveland	10.30
Foundry, by-product, delivered Cincinnati	9.50
Foundry, Birmingham	6.50
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal *Per Net Ton*

Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

Prevention of Dust Diseases Should Aim at Fine Particles, Report Says

THE report of the preventive engineering committee of the Air Hygiene Foundation of America, Inc., Pittsburgh, written by Prof. Philip Drinker of Harvard, chairman, and other technical specialists on the committee, advises that engineers in the "dusty trades" can and should cut heavy dust concentrations below the present limits warranted by medical knowledge. This action is important, the report explains, not only to further safeguard the health of workmen, but to give employers the maximum protection against unjust claims.

Discussing methods of determining dusts, the report states that present dust-sampling and dust-estimating methods undoubtedly will be amended and changed from time to time in the light of new knowledge and further experimentation. Where dust control alone is in question, the use of simplest possible procedure which will give the necessary information, is recommended.

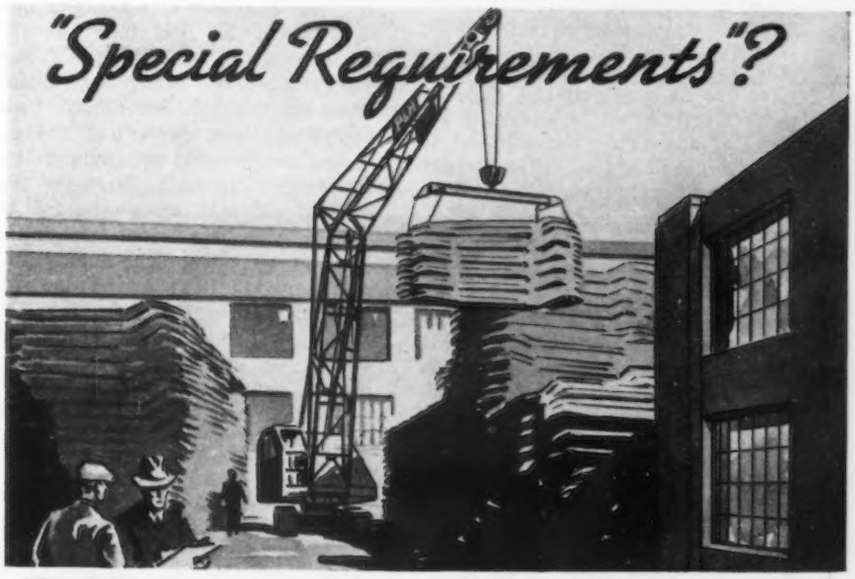
Concerning the size of dust particles, the report observes that much has been made of the fact that particles found in autopsied lungs are of the order of 1 micron (1/25,000 of an in.)—about like the common bacteria. It is argued, therefore, that the human anatomy and physiology exercises "some phenomenally accurate size grading which excluded larger particles."

The report says "there is no reason whatever to look for any such mysterious explanation. The sizing is done in the air before the dust is breathed and not by the man after it has been breathed." It is pointed out that the larger particles tend to fall from the air by their own weight and that "only those small enough to act as part of the transporting air stream are likely ever to reach the lungs."

"In diseases such as silicosis and asbestosis, particles must reach the alveoli (minute air sacs of the lungs) or no silicosis or asbestosis results. In maladies like hay fever, the harm is done by particles which may be 15-30 microns instead of 1 micron.

"Toxic dusts such as lead and manganese are much more likely to produce ill effects if breathed than if swallowed. The reason for this difference is physiological; it is established and should not be ignored in dust control problems. Again common sense tells us that the finer particles of lead are vastly more apt to be breathed than the larger.

"It follows then that dust control for hygienic reasons should be aimed at the fine rather than the coarse particles. Continuing this argument to its logical conclusion, if one could avoid use of 1 micron dust or less, or exclude it from the dust which passes a 325-mesh screen, nearly all dust diseases would be eliminated. This is not at all an academic idea, for dedusting processes are not new and are being applied in many industries. If some of the mechanical ingenuity which is now being ap-



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plied unthinkingly to creating 1 micron dust were directed to ways for avoiding it, probably it would be discovered that dusts which are too large to be breathed would serve many processes just as well as those which are around 1 micron in size.

"If the breathing of dust causes disability of any sort—silicosis is only one manifestation—then it follows that there must be some degree of air cleanliness from which no disability will result to the average man during the average working period.

"The super-cautious person may claim that the permissible concentrations, commonly called thresholds, are not precise and generally have not been established. This is perfectly true, but emphasizing instead of answering the question, is merely passing the responsibility along to the engineer.

"The absurdity of splitting hairs in order to achieve precisely the degree of cleanliness which fits medical knowledge, is accentuated when the engineer begins his design work. He does not base his calculations on dust counts, but on the volumes of air to be handled, together with the best data he can get on the gross dust loading—cubic feet or thousands of cubic feet per hour and pounds of dust per day. If left to his own devices he will do his best to achieve a dust concentration substantially lower than any medical knowledge warrants. Why, then, wait for the mythical thresholds before taking action."

The report includes a table giving latest available information on the minimum air velocities necessary in certain industries to insure the maintenance of dust concentrations at safe levels.

The preventive engineering committee asserts that many firms have neglected heavy dust concentrations in cases where the dust is of no proven harm, and adds:

"There is no satisfactory medical answer at present to this question, but the engineer is making a bad mistake if he lets men breathe heavy dust concentrations of any material. If no other reason for dust control can be found, then one should read transcripts of some of the recent suits at common law in which fantastic damages for alleged silicosis were granted to men who breathed dust containing little or no silica. The courts and compensation boards are not impressed with subtle distinctions between dusts with 10 per cent and 40 per cent quartz, especially when medical experts are reluctant to make definite statements as to the comparative significance of such differences.

"It would be well to realize that men working in dusty trades suffer far more from respiratory troubles of all kinds than do men who work in clean air. The evidence that excessive dustiness of any kind is harmful is beyond argument."

The committee attributes the handicap in this general field to the lack of fundamental data and recommends a number of specific engineering researches for the foundation to undertake in the coming year.

Besides Professor Drinker, other members of the foundation's preventive-engineering committee are Dr. J. M. DallaValle, United States Public Health Service; Theodore F. Hatch, New York State Department of Labor; H. M. Nichols, Hyde Park, Mass.; S. C. Vessy, Cleveland; and William P. Yant of Pittsburgh, formerly of the United States Bureau of Mines.

Power Transmission Group to Incorporate

AT an open meeting of the Power Transmission Council Dec. 3 at the Hotel Roosevelt, New York, announcement was made of the intention of the association to incorporate under the laws of the State of Delaware. The actual purpose of this change from a loose-knit voluntary cooperative industrial association to an incorporated body is to provide a legal entity for the council which will permit it to hold patents on mechanical power transmission equipment developed by its engineers, and to license various manufacturers to make and sell such equipment.

Directors of Power Transmission Council, Inc., will be as follows:

Chairman-of-the-board, C. E. Brinley, American Pulley Co., Philadelphia; vice-chairman, M. M. Jones, Akron Belting Co., Akron, Ohio; P. C. Brown, I. B. Williams & Sons, Dover, N. H.; W. H. Fisher, T. B. Wood's Sons Co., Chambersburg, Pa.; W. W. French, Dodge Mfg. Corp., Mishawaka, Ind.; A. P. Homer, Power Transmission Council, Boston; B. A. Kieley, R. & J. Dick Co., Inc., Passaic, N. J.; R. M. Pindell, Jr., Alexander Brothers, Inc., Philadelphia; J. Edgar Rhoads, J. E. Rhoads & Sons, Wilmington, Del.; A. F. Townsend, Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.; F. H. Willard, Graton & Knight Co., Worcester, Mass.

The officers of Power Transmission Council, Inc., will be:

President, A. P. Homer; vice-president, V. A. Hanson; treasurer, D. W. McAllen; secretary, D. M. Rae.

Headquarters office of the council is at 75 State Street, Boston.

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Concealed Corrosion Of Insulated Metal Panels

(CONTINUED FROM PAGE 53)

rosion will be at a practical minimum if the glue is neutral or mildly alkaline.

To measure the capacity of certain glues to develop alkalinity, films of glue were prepared upon metal discs. These films were dried and aged for two weeks. Then these films were placed in distilled water. By adding modified methyl red indicator, titrating with 1/10 normal hydrochloric acid to neutrality at frequent intervals (stirring constantly) the rate of liberation of alkali was measured. Knowing the weight of the dry glue used and the concentration of the neutralizing acid employed (hydrochloric acid) the alkalinity was determined in terms of weight of caustic soda per weight of dry glue. Curves shown on page 53 illustrate the difference between various types of cement.

In the field, the testing of the glue is more difficult, but some indication can be obtained by placing red litmus paper in contact with the moistened edge of the panel. If the glue is strongly alkaline, it will produce a sharp blue line on the paper. The edge should be scraped or sanded smooth before applying the paper.

Industrial Power Transmission

(CONTINUED FROM PAGE 51)

to judge the results of any plan, hence the insistence that power transmission problems be considered in their relationship to *all* the factors of economic production.

It is amazing what results will proceed from careful, detailed studies in most industrial plants when made from the standpoint of the economics of power distribution, production flow, motion economy and materials handling. When it is considered that almost 70 per cent of the machines in America (to say nothing of the rest of the world!) is still being driven by the line-shaft transmission systems our great grandfathers designed, and which we have improved only in technical details, it must be obvious that a great field for the reduction of manufacturing costs still lies unexplored. Even a plant of moderate size pays an annual bill of $200,000 for electric power. If what is called an "economical line-shaft drive" wastes $50,000 of this, and an especially bad drive system wastes $100,000, the power transmission system is surely worth a great deal of consideration. When to the purely transmission wastes are added the losses involved in plant operations along other than scientifically planned lines, it is no wonder that manufacturing costs are still much too high in most plants.

"If there is any disposition on the part of readers," says Morgan G. Farrell, in an editorial on this subject, "to console themselves with the thought, 'My plant can't be as bad as that,' we should suggest the very moderate experiment of having the local power company send up a couple of its best engineers to measure the actual friction load in the plant and segregate it as far as possible by departments. If the owners do not find enough leaks as a result of this simple experiment to start them on the way to a study of a complete modernization plan, they will have made history. For, everyone else who has tried this has found something worth while to correct."

(The next article in this series will treat of factors which limit the economic application of present systems of transmitting power to driven machines, with suggestions as to the lines of research to be employed to effect improvements.)

Export trade in refractory products increased 7.5 per cent in October as compared to September, according to preliminary statistics released by the Metal and Minerals Division of the Department of Commerce. The principal increase in the October trade was in magnesite bricks and shapes although small gains were also registered in fire clay shapes and "other fire brick." Shipments of silica brick shapes, high temperature and refractory cement and standard 9-in. fire-clay brick declined.

Employment in the stove, range and furnace industry rose to 41,693 in 1935, the Bureau of the Census reports, an increase of 38.1 per cent over 1933. Wages, aggregating $44,161,905, exceeded the 1933 wage figure by 63.8 per cent. Value of all products was $185,108,518, an increase of 57.2 per cent over the 1933 value of $117,736,718.

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THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . Machine tool demand again expands in anticipation of price advances.

. . . Louisville & Nashville Railroad to spend $400,000 for shop equipment.

Cincinnati

MACHINERY demand expanded a little more the past week over the preceding period. The uptrend, however, is slower than during the preceding quarter. Greatest increase is seen in heavy tools, where ordering is becoming more frequent. Since large tools are usually the last to feel market changes, the improved heavy demand adds firmness to the current trends and indicates stability in present consumer interest. Demand from foreign sources, particularly for milling machines, has also expanded, while domestic business may almost be described as brisk. Factory operations are unchanged, although the trade indicates further extension of delivery dates. Manufacturers in many instances are selecting labor with a view toward keeping conditions harmonious so that present movement in business may remain.

Louisville

THE Louisville & Nashville Railroad has authorized expenditure of approximately $400,000 for modernization of mechanical facilities at the South Louisville shops. Plans call for installation of the new machinery to start immediately with a view to completing the modernization program by next summer. Installation of 87 new machines and tools ranging in cost from $60 to $30,000 each is planned. The equipment replacing obsolete devices will represent the latest developments. Purchase of the portable equipment for shops at Mobile, Birmingham, Ravenna, Corbin, Nashville, Evansville and Paris, Tenn., also was authorized.

New York

THE increased volume of buying during the first week of this month has not yet lessened appreciably. Deliveries are still greatly extended, and no immediate improvement is seen. Inquiries are good, and some orders are apparently being placed in anticipation of price advances. An interesting and significant feature of present-day business is that Government contracts, which formerly were eagerly sought, are today being ignored in a great many offices because of the stringency of the Walsh-Healey Act regulations. This situation is not so much due to the machine tool sellers being disinclined to adhere to Federal requirements, as to the difficulty of being absolutely certain that all the many parts composing the machine have been made in conformance with the labor conditions set down in the act. Representatives from Peugeot, a French automobile company, are now in Detroit on a buying mission for their concern.

Pittsburgh

SOME customers are asking for quotations on two days' notice, and there is an apparent last-minute rush to get orders in on machinery before the end of the year. There has been no let-up in the flood of inquiries, the volume being higher this week than last. Orders are rolling in, and there is no doubt that business volume this month will be one of the best for any December on record. Reflecting high steel mill activity, demand for heavy machines, such as roll grinders, is showing marked improvement. Inquiries for planers and pipe mill machinery are very active, and the requests for data on lathes make the outlook especially bright. Owing to the particularly tight situation regarding shipments, it is practically impossible for sales agents to make definite delivery promises.

Chicago

CHICAGO dealers are thoroughly convinced that price advances of from 5 to 10 per cent will be general about the first of the year. Such announcements are already at hand from boring equipment, turret lathe, grinder and drill press manufacturers. Deliveries are constantly growing worse, and buyers' efforts to argue about them only result in lost time. Heretofore price advances have checked the market temporarily and, if history repeats, machine tool manufacturers may get a breathing spell in January. However, the potential demand is here and such a halt of buying would tend only to check further extension of deliveries for a short period. It is possible that the Allis-Chalmers Mfg. Co.'s large program may again come to life. New buying, still widely scattered, remains at a high level. Small tools are moving fast at a time when the demand usually declines.

Cleveland

ACTIVITY in the machine tool market has increased, evidently being stimulated by advancing prices. Advances of 10 to 15 per cent, effective Jan. 1, were announced by several builders during the week. A large number of orders for turret lathes reached a Cleveland manufacturer last week on the last day of accepting orders before its 10 per cent price advance, and this company has since made some sales at the new prices. Orders for automatic machines are in good volume, and deliveries with a Cleveland manufacturer have become more extended. The Nelson Machine & Mfg. Co., Cleveland, and the Hoover Co., North Canton, Ohio, have each bought several machines for tool rooms. Inquiries are out from the Louisville & Nashville Railroad for machinery for its Louisville shops. Its purchases are expected to be large.

British to Build Turkish Steel Plant

LONDON, Dec. 15—A contract for the construction of the iron and steel plant required under Turkey's first five-year industrial plan has been signed with the Sumer Bank at Angora by H. A. Brassert & Co., Ltd., London.

The plant and its installation at Karabuk, near the iron mines of Sofranboli and within easy reach of the Turkish coalfields on the Black Sea coast, will cost approximately £3,000,000 ($15,000,000). Payment is to be made by the export of Turkish minerals such as chrome, antimony, and molybdenum, which will be marketed abroad by the Anglo-Turkish comptoir.

Upon completion in two and one-half years' time, the annual output of the new works will be approximately 150,000 tons. The installation is to be carried out jointly by British and Turkish engineers and laborers, the material used being of British and Turkish origin. The works, the first of their kind in Turkey, will be of the most modern design and will be operated on behalf of the Government by the Sumer Bank, to which a great number of the State enterprises in Turkey are now entrusted.

The contract is the first of any importance concluded with a British group since the war. It was secured in the face of keen competition from Krupps, of Essen.

FINANCIAL NOTES

National Steel Corp. has declared a dividend of $1.62½ a share of capital stock. This brings the total dividends paid on National Steel Corp. shares for the current year to $3.12½. An increase of $1 per year in the regular dividend rate, and a change in the time of future directors' meetings for dividend action was announced. Of the total dividend declared today, Mr. Weir, chairman of the board, said 62½c. represents a payment which would have been declared to establish the new annual $2.50 per share basis at the meeting which ordinarily would have been held in January. Henceforth, dividends will be declared in the final month of the quarter for which they are payable. Inclusion of the 62½c. payment now obviates the necessity for the January meeting and also reduces the amount of the Federal undistributed earnings tax which will be payable on the year's earnings.

Sloss-Sheffield Steel & Iron Co. has announced it is planning a new issue of 6 per cent preferred stock to replace the present issue, which is outstanding in the amount of $6,700,000. Sloss-Sheffield will also pay a preferred dividend of $1.50 per share on Dec. 17, its third of the year.

American Car & Foundry Co. and wholly owned subsidiaries, in the six months ended Oct. 31, had net profit of $729,376 after depreciation and Federal normal tax. This compares with net loss of $1,731,319 in the same period last year.

Detroit Gray Iron Foundry Co. has declared an extra dividend of 60c. and a regular semi-annual dividend of 10c., both payable Dec. 21 against stock of record Dec. 15.

Midland Steel Products Co. has declared two common stock dividends, one of $2 a share, payable Dec. 23, and one of 50c., payable Jan. 1. On Oct. 1 a dividend of $1.25 was paid, prior to which the stock was on a 25c. quarterly basis.

Otis Steel Co. has declared dividend of $4.12½ on the new convertible first preferred stock. Declaration coincided with announcement by directors that the company's plan of recapitalization would take effect Dec. 14, and that Dec. 28 would mark deadline for exchange of stock by prior preferred holders under the new plan.

Granite City Steel Co. has declared quarterly dividend of 25c. a share, payable Dec. 24 against stock of record Dec. 14.

American Rolling Mill Co. has declared dividend of $1.50 on the 6 per cent preferred stock, payable Jan. 15 to stockholders of record Jan. 1.

Jones & Laughlin Steel Corp. declared a dividend of 2 per cent ($2 a share), payable Dec. 23, on account of arrearage in dividends on its preferred stock. This is the second declaration, one of $1.75 having been made previously which is payable Dec. 25.

. . TRADE NOTES . .

Globe Machinery & Supply Co., Des Moines, Iowa, on Dec. 1 was separated from the jobbing division of the company and will be operated henceforth under the corporate name Globe Hoist Co. The jobbing division will continue to operate under the corporate name Globe Machinery & Supply Co. The offices, factories, sales policies and sales representation of the Globe Hoist Co. will be the same as maintained before. Also, the offices, repair shops and warehouses of the Globe Machinery & Supply Co. will be maintained as before.

The officers of both companies will remain virtually the same. For the Globe Hoist Co. the officers will be: F. W. Swanson, president and general manager; F. S. Harshbarger, vice-president in charge of sales; H. A. Bruner, treasurer; and F. W. Swanson, Jr., secretary. The officers of the Globe Machinery & Supply Co. will be: F. W. Swanson, president and general manager; H. A. Bruner, vice-president and treasurer; and F. W. Swanson, Jr., secretary.

H. Boker & Co., New York, sales representatives for specialty steels, have acquired all rights to Kinite alloy die steel, including the patents, goodwill, trade name and stock. Kinite will be available as heretofore both in bars and in castings. All sales matters will be handled from the New York office and Kinite castings, formerly made at Fairmont, W. Va., will be made in Detroit. Next year H. Boker & Co. will complete its hundredth year in business, having been founded in 1837.

Meriam Co., 1955 West 112th Street, Cleveland, has completed an extension to its gas and oil engine rebuilding plant. The new premises, which adjoin the old, are 100 ft. x 54 ft., thus enabling engines up to large sizes to be readily handled. The test floor for assembling and testing consists of a solid block of concrete 60 ft. long, and permits six power units to be tested at one time.

Shafer Bearing Corp. has moved its general offices to 35 E. Wacker Drive, Chicago, and is also establishing a Chicago district sales office at 545 West Washington Boulevard, with a display of the Shafer radial-thrust roller bearing and mounted bearing units for industrial power transmission and other applications. A complete stock will be maintained for immediate delivery in the Chicago territory.

NOPAK VALVES

An air leak equal to 1/16" diameter hole costs $28.00 per month. Air is expensive, control it efficiently and accurately with a NOPAK valve —a patented leak-proof valve guaranteed to stay tight without maintenance. Its flat, patented disc together with a packless spindle prevents sticking and assures you of many years of leak-proof operation. Permits throttling or quick opening. Easy to operate. Seat protected at all times and cannot wear out. NOPAK valves are suitable for air, gas, water, or oil. *Write for Bulletins.*

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PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

General Electric Co., Schenectady, has let general contract to H. K. Ferguson Co., Cleveland, for branch plant at Houston, Tex., two stories, instead of one story, as recently noted, 150 x 230 ft., with storage and distributing facilities. Cost close to $200,000 with equipment. E. M. Wise is district manager at Houston.

Cerro de Pasco Copper Corp., 44 Wall Street, New York, has approved plans for new lead refining plant at mining properties at Oroya, Peru, including storage and distribution buildings. Machinery will be electrically operated with power supply secured from recently constructed hydroelectric generating station at Mantare. Cost over $700,000 with machinery.

General Slicing Machine Co. of New York, Inc., 54 West Twenty-first Street, New York, has leased space in building at Berry and South Third Streets, Brooklyn, for local plant.

Metal & Thermit Corp., 120 Broadway, New York, plans one-story addition to branch plant at South San Francisco, Cal. Cost close to $75,000 with equipment.

Department of Water Supply, Gas and Electricity, Borough of Queens, Long Island City, New York, has filed plans for one-story repair shop at Barwell Avenue and Poyer Street. Cost about $45,000 with equipment.

F. & M. Schaefer Brewing Co., Kent Avenue, South Ninth and Tenth Streets, Brooklyn, has let general contract to White Construction Co., 95 Madison Avenue, New York, for two eight-story additions, 90 x 155 ft., to double present capacity. Cost close to $1,500,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 8 for parts for airplanes for Brooklyn Navy Yard (Schedule 900-287).

Modern Machine Corp., 285 North Sixth Street, Brooklyn, manufacturer of machinery and parts, has leased space in building of Weill Lithographing Co., South Third Street, for plant.

Continental Can Co., 100 East Forty-second Street, New York, has let general contract to Austin Co., Cleveland, for one-story addition to branch plant at Syracuse, N. Y. Cost over $50,000 with equipment. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers.

Jacob Ruppert, 1639 Third Avenue, New York, brewer, has taken out a permit for alterations and improvements in four-story brewery in East Ninety-third Street, including installation of steel water-cooling tower. Cost about $65,000. H. L. Russell, is company engineer.

Procter & Gamble Mfg. Co., Port Ivory, Staten Island, New York, manufacturer of soaps, washing powders, etc., has plans for one-story addition, primarily for storage and distribution. Cost close to $50,000 with equipment.

Potter Tool & Machine Works, 79 East 130th Street, New York, manufacturer of machinery and tools, has leased space in building at 1916-38 Park Avenue for plant.

American Pulp Corp., 182 Cornelison Avenue, Jersey City, N. J., has purchased former plant of American Salpa Co., Spotswood, N. J., more recently owned by Titanium Pigment Co., New York, consisting of one and two-story buildings on 65-acre tract and representing an initial investment of over $3,000,000. It will be remodeled by new owner to give employment to about 125 persons. Plant is scheduled to be ready for operation early next spring.

Atlantic Refining Co., 260 South Broad Street, Philadelphia, has plans for new bulk oil storage and distributing plant at Cliffs on Cape Fear River, near Wilmington, N. C., with pumping station, steel tank capacity of 4,000,000-gal. at one time, and other facilities. Cost over $800,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Dec. 21 for steel drop forgings for sight mounts (Circular 274), 24 hobs (Circular 276), three sets of cutter buttons (Circular 283), 7135 zinc-base die castings for shipping plugs chemical mortar shell (Circular 257), 1000 chain assemblies (Circular 271); until Dec. 22, 2900 steel forgings, 81-mm. shell (Circular 269), one special machine for mixing explosive compositions (Circular 268); until Dec. 23, four motor-driven, precision type bench lathes (Circular 284).

BUFFALO DISTRICT

Hooker Electrochemical Co., Buffalo Avenue and Forty-seventh Street, Niagara Falls, N. Y., manufacturer of industrial chemicals, etc., has plans for one-story addition. Cost about $50,000 with equipment.

United States Engineer Office, First District, New York, asks bids until Dec. 23 for one portable steel industrial building for Ithaca, N. Y. (Circular 115).

Spencer Kellogg & Sons, Niagara Square, Buffalo, manufacturer of linseed oil products, etc., has filed plans for extensions in bin department at plant at 309 Ganson Street, for storage and distribution. Cost over $50,000 with equipment.

Gilbert Klinck Brewing Co., 10-24 West Bennett Street, Buffalo, has let general contract to C. H. Everitt, Inc., 295 Auburn Avenue, for superstructure for brewery units, to complete plant on which work has been started. Entire project will cost over $125,000 with equipment.

NEW ENGLAND

Himmel Brothers, 200 Commerce Street, New Haven, Conn., manufacturer of metal store fronts, etc., has asked bids on general for new two-story plant at Hamden, Conn., 150 x 200 ft., with one-story wing, 30 x 100 ft., for offices. Cost close to $100,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, is architect and engineer.

Commanding Officer, Ordnance Department, Watertown Arsenal, Watertown, Mass., asks bids until Dec. 21 for eight steel outriggers (Circular 233).

White Fuel Corp., 900 East First Street, Boston, has engaged George P. Carver Engineering Co., 114 State Street, to prepare plans for coal elevator on South Boston waterfront, to replace unit recently destroyed by fire. Cost about $50,000 with hoisting and conveying equipment, storage facilities, etc.

Stamford Rubber Supply Co., Shippan Lane, Stamford, Conn., has let general contract to Mariani Construction Co., 222 Forbes Avenue, New Haven, Conn., for three-story addition, 60 x 60 ft. Cost over $75,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, is architect and engineer.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Dec. 21 for 172 barrel reflectors, caliber 0.30 (Circular 103); until Dec. 22, 813 click springs, 730 cartridge stop springs, 1619 latch springs and 1219 retracting slide lever springs (Circular 102).

Sprague Meter Co., South Street and Railroad Avenue, Bridgeport, Conn., manufacturer of gas meters and parts, has started construction on two two-story additions, 66 x 85 ft., and 30 x 30 ft., first noted for expansion in manufacturing department and latter for office service. Cost close to $65,000 with equipment. Hewlett Construction Co., 1385 Iranistan Avenue, is general contractor.

Wire Rope Corp., 464 Congress Avenue, New Haven, Conn., has plans for a one-story addition, 150 x 150 ft.; also a smaller two-story structure. Leo F. Caproni, New Haven, is architect.

WASHINGTON DIST.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Dec. 24 for following automobile parts: Brake equipment, air compressor brackets, gears, gages, gasoline tanks, hubs, hand brakes, air brake equipment, fan drive pulleys, air compressor pulleys, fan hub pulleys, lubricating guns, wheels, pipe nipples, water tanks and other equipment (Proposal 398-56).

Flynn & Emrich Co., 301 North Holliday Street, Baltimore, manufacturer of stokers and parts, has let general contract to Edward L. Walsh, 1508 Bolton Street, for one-story foundry addition. Cost about $40,000 with equipment. W. S. Austin, Maryland Trust Building, is consulting engineer.

Weaver Tankage Co., South Money Point, Va., manufacturer of commercial fertilizer products, plans rebuilding part of plant recently destroyed by fire. Loss about $40,000 with equipment.

Board of District Commissioners, District Building, Washington, asks bids until Dec. 21 for one 18-in. engine lathe and one 20-in. heavy-duty crank shaper.

General Purchasing Officer, Panama Canal, Washington, asks bids until Dec. 23 for one bench type insulation shearing machine, one motor-driven commutator undercutter, one commutator truer, 13 steel revolving shelving units and other supplies (Schedule 3205).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 5 for turbine and motor-driven pumping units and spare parts for Eastern and Western Navy Yards (Schedule 9516).

Quartermaster, Fort Belvoir, Va., asks bids until Dec. 23 for six steel storage tanks for coal-burning water heaters (Proposal 406-28).

SOUTH ATLANTIC

Kieckhefer Container Co., West Canal Street, Milwaukee, manufacturer of corrugated board containers, has let general contract to James Stewart & Co., 230 Park Avenue, New York, for new pulp and board mill near Plymouth, N. C., where 75-acre tract recently was acquired. Plant will consist of one and multi-story units, with power house, pumping station and other mechanical divisions. Cost about $3,500,000 with machinery, instead of smaller sum previously noted in these columns. Company is affiliated with Eddy Paper Corp., Three Rivers, Mich.

Quartermaster CCC, Charleston, S. C., asks bids until Dec. 21 for two drill presses, 10 scroll saws, 14 electric motors and miscellaneous tools (Proposal 5407-68).

International Harvester Co., 606 South Michigan Avenue, Chicago, has low bid on general contract from Wesley Construction Co., 441 Courtland Street, N.E., Atlanta, Ga., for one-story addition to branch plant for motor truck division on Humphries Street, Atlanta, 110 x 165 ft. Cost close to $65,000 with equipment.

SOUTH CENTRAL

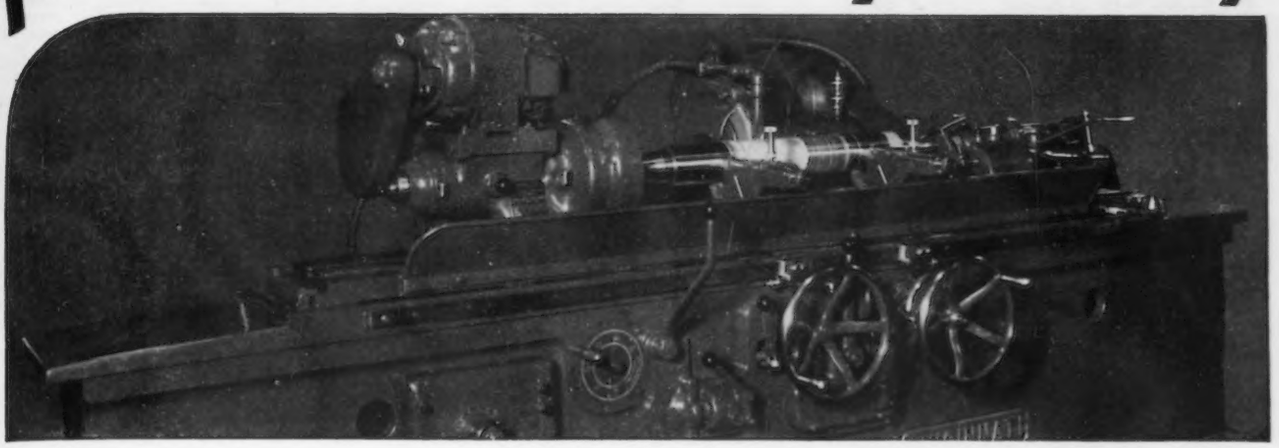
Chalmette Petroleum Corp., Chalmette, La., has authorized expansion and improvements in local oil refinery, with equipment to double handling capacity, and cracking machinery for enlargement of gasoline manufacturing division. Cost about $400,000 with equipment.

Louisville & Nashville Railroad Co., Louisville, plans installation of machine tools and miscellaneous machinery at locomotive and car construction and repair shops at South Louisville, Birmingham, Mobile, Ala.; Nashville and Paris, Tenn., and Evansville, Ind. Cost close to $400,000.

Perry & Derrick Co., 908 Central Avenue, Cincinnati, manufacturer of paints, oils, varnishes, etc., will take bids on general contract at once for four-story addition to plant at Dayton, Ky. Cost over $70,000 with equipment. E. C. Landberg, 114 Garfield Place, Cincinnati, is architect.

United States Engineer Office, Vicksburg, Miss., asks bids until Dec. 23 for two revolving towing chocks (Circular

for Better, Faster Grinding



Operation: Finish Grind Wheel Spindle.
Material: Steel Forging S.A.E. 3145.
Spindle Speed: 1700 R. P. M.
Coolant: 1 Part Sunoco to 40 Parts Water.
Courtesy of Cincinnati Grinders, Inc., Cincinnati, Ohio

SUNOCO IS USED SUCCESSFULLY ON ALL TYPES OF MACHINES

WITH the aid of Sunoco, all types of grinding machines produce better work at higher speeds and at lower costs because it offers these definite advantages:

SUNOCO increases the life of abrasive wheels.

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A trial under your own operating conditions will convince you that Sunoco makes faster, better grinding possible.

Operation: Finish Grind Gear Tooth Contour.
Material: S. A. E. 6150 Steel.
Spindle Speed: 1240 R. P. M.
Coolant: 1 Part Sunoco to 40 Parts Water.
Courtesy of Pratt and Whitney, Hartford, Conn.

SUNOCO
EMULSIFYING
CUTTING OIL

Operation: Surface Grinding 24 in. dia. Transmission Sprocket.
Stock Removed: 1/32" per Side.
Coolant: 1 Part Sunoco to 40 Parts Water
Courtesy of the Blanchard Company, Cambridge, Mass.

SUN OIL COMPANY, PHILADELPHIA, U. S. A.

Subsidiary Companies: Sun Oil Company, Ltd., Montreal, Canada
British Sun Oil Company, Ltd., London, England

154), one vertical, flush head type marine boiler (Circular 155).

Tennessee Stove Works, Inc., East Fourteenth Street, Chattanooga, Tenn., plans one-story addition, 100 x 140 ft. Cost over $50,000 with equipment. Gordon Smith, Volunteer Life Building, is architect.

Chicago Mill & Lumber Co., Tallulah, La., plans rebuildnig local veneer mill including machine shops and mechanical divisions, recently destroyed by fire. Loss over $500,000 with machinery. General offices are at 111 West Washington Street, Chicago.

SOUTHWEST

State Building Commission, Bi-Partisan Advisory Board, Capitol Building, Jefferson City, Mo., asks bids until Dec. 30 for extensions and improvements in power plant at institution at Farmington, Mo., including new equipment. Joseph A. Osborn and H. H. Morrison, Syndicate Trust Building, St. Louis, are associated engineers. Charles A. Haskins, Finance Building, Kansas City, Mo., is general supervising engineer.

Purchasing and Contracting Officer, Missouri-Kansas District, CCC, Fort Leavenworth, Kan., asks bids until Dec. 28 for one 12-500-gal. steel gasoline tank (Proposal 5703-52).

City Council, City Hall, Kansas City, Kan., has rejected bids recently received for equipment for municipal grain elevator on Missouri River Levee, including general operating machinery, conveying equipment, dust-collecting system, etc., and gasoline locomotive, and will ask new bids soon. Horner & Wyatt, Board of Trade Building, Mo., and Walter F. Schulz, Shrine Building, Memphis, Tenn., are associated consulting engineers.

Arkansas Power & Light Co., Pine Bluff, Ark., has authorized new hydroelectric generating plant on Ouachita River, near Hot Springs, Ark., with initial capacity of 31,700 hp. Project will include power substations and switching stations, with transmission lines for connection with two existing generating plants on same river. Cost about $4,000,000.

Regan Forge & Engineering Co., San Pedro, Los Angeles, manufacturer of oil well equipment and supplies, plans new works at Houston, Tex., where site is being selected, consisting of main one-story forge, machine and assembling works, and several smaller units. Cost close to $100,000 with equipment. Company is considering removal of large section of present works to new location.

Edward Auge Packing Co., 1300 South Brazos Street, San Antonio, Tex., food canner and packer, plans extensions and improvements in one-story plant, 100 x 150 ft., including equipment. Cost close to $30,000. Wilson & Werner, 404 West Laurel Street, are architects.

Board of Education, Conroe, Tex., plans manual training department in new two-story high school, for which general contract has been let to Nathan Wohlfeld, Houston, Tex. Cost about $250,000 with equipment. Lamar Q. Cato, Houston, is architect.

Arkansas Power & Light Co., Pine Bluff, Ark., plans extensions and improvements in steam-operated electric power plant at Little Rock, Ark., including new 10,000-kw. turbo-generator unit and auxiliary equipment. New switching station will be built and extensions made in transmission lines. Cost about $500,000.

City Council, Brenham, Tex., plans new municipal electric power plant, installation to include four 250-kw. diesel engine-generator units and auxiliary equipment; a power substation and electrical distributing system will be installed. Cost about $300,000, of which $140,000 will be secured through Federal grant.

WESTERN PA. DIST.

Western Steel Products Mfg. Co., Sharpsville, Pa., manufacturer of seamless steel tubing and kindred products, has plans for one-story mill, 80 x 500 ft. Cost over $350,000 with equipment. A. B. Small is general manager.

United States Engineer Office, Pittsburgh, asks bids until Jan. 4 for equipment for hydroelectric generating plant of 94-kva. capacity at Emsworth locks and dam, including hydraulic turbine, generator and accessories (Circular 202).

Municipal Sanitary Board, Bluefield, W. Va., W. A. Light, chairman, asks bids until Dec. 22 for pumping machinery and auxiliary equipment for station for municipal sewage disposal works, including two 2100-gal. and one 1400-gal. per min. motor-driven centrifugal pumps, one 125-gal. and one 75-gal. per min. motor-driven vertical centrifugal pumping units, with motor controls, switchboard and accessories. Morris Knowles, Inc., Westinghouse Building, Pittsburgh, is consulting engineer.

OHIO AND INDIANA

Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth Street, Cleveland, has asked bids on general contract for two additional stories on present three-story plant, 54 x 180 ft. Cost over $70,000 with equipment. Ernest McGeorge, 1900 Euclid Avenue, is engineer.

Spero Electric Corp., 2560 East Thirty-third Street, Cleveland, manufacturer of electrical equipment, plans early removal to one-story building, recently acquired at East 185th Street and St. Clair Avenue, about 35,000 sq. ft. floor space, where capacity will be increased.

Cleveland Twist Drill Co., East Forty-ninth Street and Lakeside Avenue, Cleveland, has asked bids on general contract for five-story addition, 220 x 235 ft. Cost close to $350,000 with equipment. George S. Rider Co., Terminal Tower, is architect. J. D. Cox is president.

Master Electric Co., Davis and Bruner Streets, Dayton, Ohio, manufacturer of electric motors, electric fans and kindred products, has purchased adjoining property of about five acres, improved with buildings totaling 20,000 sq. ft. floor space, and will use for expansion. Company has taken over its subsidiary, Pioneer Heat regulator Corp., Dayton, manufacturer of heating control systems, and will consolidate with parent organization.

Contracting Officer, Material Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Dec. 21 for 170,000 ft. extra-flexible cable (Circular 386), 240 streamline tail wheel assemblies (Circular 365), chrome molybdenum steel tubing (Circular 395); until Dec. 22, cowl fastener springs and cowling fastener studs (Circular 385), chemical tank discharge puncture disks, springs, gaskets, tubes, plungers, housing levers, trunnoins, terminals, etc. (Circular 383), 4500 ft. control cable casing for 1/16-in. cable (Circular 384).

Peerless Foundry Co., 1853 Ludlow Street, Indianapolis, manufacturer of grey iron castings, has awarded general contract to W. C. LeFeber, 6110 East Tenth Street, for one-story addition, 25 x 100 ft. Cost about $30,000 with equipment. R. W. Miller, Peoples' Bank Building, is architect.

Charles L. Gohmann Corp., New Albany, Ind., recently organized, has established a plant at Vance Street and line of Monon railroad to manufacture stoves and ranges.

Delicious Beverage Co., 11411 Miles Avenue, Cleveland, has let general contract to Joseph Tepper Construction Co., 3468 East 123rd Street, for one-story mechanical-bottling works, 45 x 75 ft. Cost about $40,000 with equipment. M. P. Halperin, 3567 East 151st Street, is architect.

Kokomo Sanitary Pottery Corp., Kokomo, Ind., manufacturer of sanitary ware, has purchased plant and business of Globe Brass Mfg. Co., 2925 East Fifty-fifth Street, Cleveland, manufacturer of plumbers' brass goods, pipe fittings, etc., and will operate as an affiliated interest. Plans are under advisement for removal of part of works to Kokomo, where production facilities will be expanded.

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MICHIGAN DISTRICT

Forgings & Castings Co., Ferndale, Mich., manufacturer of automotive forgings and castings, has let general contract to Austin Co., Curtis Building, Detroit, for one-story addition. Cost close to $30,000 with equipment.

Consumers Power Co., Jackson, Mich., is arranging 1937 expansion and improvement program, including extensions in power plants, power substations, transmission and distributing lines, with number of primary and secondary lines for rural electrification in different districts, including service facilities. Fund of $16,147,000 is being allotted.

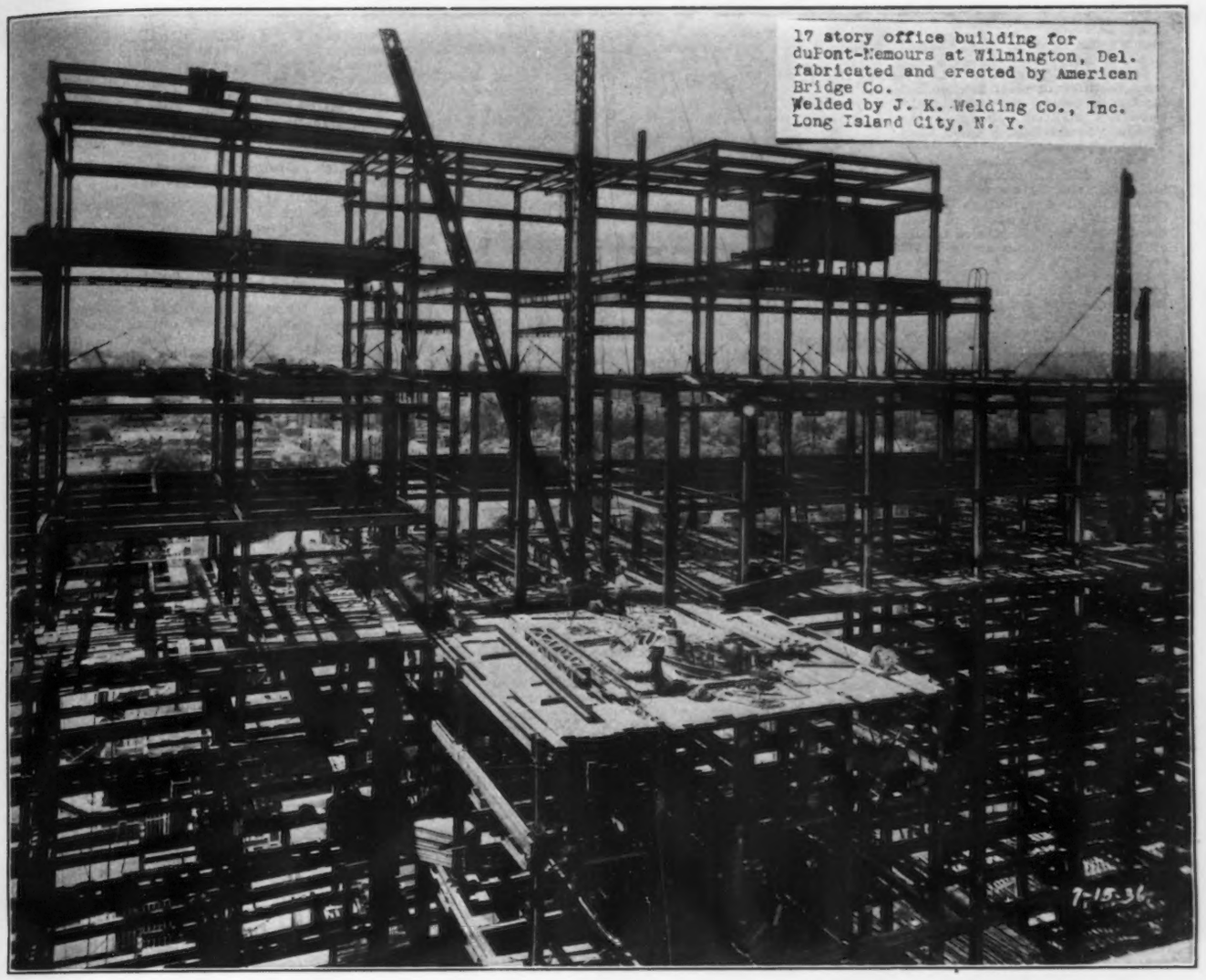
Dossin's Food Products Co., 3659 Gratiot Avenue, Detroit, manufacturer of prepared food specialties, has plans for new one-story plant on Superior Street. Cost about $35,000 with equipment. Louis W. Klei, 249 Rhode Island Avenue, is architect.

River Raisin Paper Co., Monroe, Mich., will proceed by day labor with one-story addition to pulp and paper mill, 200 x 200 ft. Cost close to $200,000 with equipment. G. H. Wood is president and general manager.

Swift & Co., Chicago, meat packers, have let general contract to DeKoning Construction Co., Kalamazoo, Mich., for one-story branch packing plant at Jackson, Mich. Cost close to $50,000 with equipment.

MIDDLE WEST

Caspers Tin Plate Co., 3424 West Forty-eighth Place, Chicago, has let general contract to Poirot Construction Co., 2001 West Pershing Road, for two-story addition, 234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fabricated and erected by American
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Department B

CLEVELAND, OHIO

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x 338 ft. Cost about $350,000 with equipment. A. Epstein, 2001 West Pershing Road, is engineer.

St. Charles Mfg. Co., St. Charles, Ill., manufacturer of steel kitchen cabinets and kindred products, has work under way on one-story addition, to more than double present production. Cost over $60,000 with equipment.

Waseca Co-Operative Electric Corp., Waseca, Minn., recently organized, will take bids soon for about 280 miles of transmission and distributing lines for rural electrification in parts of Waseca and Steel counties, with service facilities. Fund of $275,000 has been secured through Federal aid.

Product Terminal Corp., Thirty-ninth Street and Morgan Avenue, Chicago, has let general contract to Poirot Construction Co., 2001 West Pershing Road, for addition to steam power plant. Cost close to $100,000 with equipment. A. Epstein, 2001 West Pershing Road, is engineer.

Consumers Malt & Grain Co., Shakopee, Minn., affiliated with Albert Schwill & Co., Chicago, malt products, contemplates new multi-story plant for malt production, for brewery and other service. Cost over $250,000 with equipment.

Radio Steel & Mfg. Co., 6501 West Grand Avenue, Chicago, manufacturer of steel toys and kindred products, has let general contract to A. T. Herlin & Son, Inc., 6816 Clyde Avenue, for one-story addition. Cost about $50,000 with equipment. A. Bell-Howe Co., 53 West Jackson Boulevard, is architect.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until Jan. 12 for 220 reel units (Circular 49).

Chain Belt Co., 1600 West Bruce Street, Milwaukee, will proceed with construction of new machine shop, 152 x 292 ft., as additional unit of West Milwaukee plant group. Contract for excavating, foundation, and other initial work has been placed with Hunzinger Construction Co., 1827 North Thirtieth Street. Bids on other sections of project are being taken by Eschweiler & Eschweiler, architects, 720 East Mason Street.

Dane County Board, Madison, Wis., has accepted bid of J. H. Findorff & Son, 601 West Wilson Street, local, for construction of $85,000 warehouse, machine and maintenance shop and offices for County highway department. Architects are Balch & Lippert, 16 North Carroll Street.

Trane Co., La Crosse, Wis., manufacturer of steam and vapor heating specialties, has taken bids for new factory unit, 121 x 282 ft., at Bennett Street plant, designed by Parkinson & Dockendorff, Linker Building. Investment in structures and equipment is about $200,000.

Chippewa Falls, Wis., Board of Vocational Education has received approval of PWA grant of $58,500 toward construction and equipment of new vocational institute to cost $130,000. Bids will be asked at once. Howard M. Nelson, 204 East Grand Avenue, Eau Claire, Wis., is architect.

Ray Electrical Mfg. Co., Beloit, Wis., formerly Electrical Equipment Mfg. Co., has acquired site in South Beloit for new plant, first unit to be 80 x 165 ft., with power plant and warehouse. Company manufactures storage batteries and chargers, farm light plants and allied electrical devices.

Wisconsin State Board of Control, Madison, Wis., has plans by Arthur Peabody, State architect, for new stone and granite processing shop, 50 x 234 ft., 37 ft. high, at State Reformatory, Green Bay, Wis., to cost about $50,000 with motor-driven cutting, polishing and other machinery. John J. Hannan is president of board.

Waukesha County Board, Waukesha, Wis., has closed bids for addition, 70 x 200 ft., one-story, to County highway warehouse and maintenance shop, designed by S. A. Snyder, architect, 202 Roberta Avenue. Cost about $50,000. H. B. Burton is highway commissioner.

Land O'Lakes Creameries, Inc., 2201 N. E. Kennedy Street, Minneapolis, is taking bids for construction and equipment of new milk drying and processing plant at Luck, Wis., to cost about $125,000. Carl H. Buetow, 306 North Snelling Avenue, St. Paul, Minn., is architect.

PACIFIC COAST

Liquid Carbonic Pacific Corp., Ltd., 2600 East Twelfth Street, Los Angeles, manufacturer of carbonating machinery and parts, bottling equipment, etc., has let general contract to Louis C. Dunn, Inc., Monadnock Building, San Francisco, for two-story addition, 50 x 190 ft. Cost over $60,000 with equipment. Blaine Noice, 5436 Carlton Way, is engineer. Company is a unit of Liquid Carbonic Corp., Chicago.

Quartermaster, Fort Mason, Cal., asks bids until Dec. 22 for two vacuum pumps (Circular 6616-51).

Bureau of Reclamation, Denver, asks bids until Dec. 21 for one 50-ft. x 8 ft. radial steel gate and gate hoist for spillway at Kachess Dam, Yakima project, Wash. (Specifications 857-D).

Pioneer-Flintkote Co., 5500 South Alameda Street, Los Angeles, manufacturer of roofing products, building specialties, etc., has engaged Edward C. and Ellis W. Taylor, 803 West Third Street, architects, to prepare plans for several one-story additions; bids for first unit to be asked soon. Entire project will cost close to $1,000,000 with equipment. Company is a unit of Flintkote Co., New York.

Imperial Valley Irrigation District, El Centro, Cal., has plans for first unit of five hydroelectric generating plants on All-American Canal, now being constructed by Federal Government. Initial plant will comprise hydroelectric power station with capacity of 12,000 kva., standby diesel engine-electric generating plant of 5000 kw. rating, transmission lines, power substations, switching stations and distributing lines in different parts of valley area. Fund of $2,760,000 has been secured through Federal aid, and work is scheduled to begin soon. Entire project will represent total investment of $10,450,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Jan. 8 for spare parts for airplanes at Naval Air Station, San Diego, Cal. (Schedule 900-261).

Soundview Pulp Co., Bayside, Everett, Wash., manufacturer of processed sulphite pulp, has begun work on initial units of addition to mill, for which general contract recently was let to Austin Co., Seattle. Project will include several one and multi-story units for acid division, pulp manufacture and pulp storage, filter house and other structures. Cost over $1,500,000 with equipment. Lee S. Burdon is general manager.

Crafton Orange Growers' Association, Mentone, Cal., has plans for one-story precooling plant at citrus fruit-packing house, with capacity of 30 railroad cars at one time. Cost over $60,000 with equipment.

FOREIGN

Humber-Hillman Co., Ltd., Coventry, England, manufacturer of automobiles and parts, has plans for new works for production of aircraft engines, comprising several one-story units for parts production and assembling. Cost close to $1,000,000 with machinery.

Ministry of Industry, Prague, Czechoslovakia, is arranging plans for pulp and paper mill on tract acquired at Zidovitz, consisting of one and multi-story units for production of heavy wrapping paper stocks, to include power house, machine shop and other mechanical structures. A company will be formed to carry out project, with financing provided by Ministry noted. Work is scheduled to begin early in 1937, and contracts for equipment will be placed soon. Cost close to $1,500,000 with machinery.

Nippon Tar Kogyo, K.K. (Japanese Tar Industry Co., Ltd.), Tokyo, Japan, has plans for new electrolytic alkali plant for production of caustic soda and kindred specialties. Cost over $500,000 with machinery.

Canadian Car & Foundry Co., Ltd., Montreal, will remodel and expand its branch plant at Fort William, Ont., for airplane production, including parts manufacture and assembling. Cost over $75,000 with equipment.

An exhibition of the materials, devices and developments fashioned by industry for aviation will be on display until Jan. 15 at the Metals and Plastics Bureau, International Building, Rockefeller Center, New York. Safety devices will be featured and the weather bureau will present a self-explanatory display explaining its aviation service. Cross-sections of engines, pure pumps, pure pumps, floats and revolving cylinders, showing the mechanical workings of a plane can also be seen. Maps, photographs and charts of construction are included.

HY-TEN

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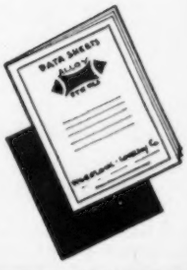

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